

ULTIMATE OFFICE PRODUCTIVITY GUIDE 2015

SINGAPORE

MARCH 2015 // S\$6.90  
WWW.HARDWAREMAG.COM

THE POWER TO DECIDE

RETHINK  
THE SENSOR

STABILIZE  
THE IMAGE

TOUCH  
TO SHOOT

LEARN

PORTING  
ITUNES  
LIBRARY

SECOND  
SCREEN  
GAMING



# TECH THAT DRIVES PHOTOGRAPHY

*Looking beyond megapixel count*



*Chi*



# ASUS Transformer Book *Chi* **RAZOR-THIN. SUPER FAST.**



T300 Chi



T100 Chi



T90 Chi

The 2-in-1 ASUS Transformer Book Chi is the best of both worlds. A tablet with picture perfect 2560 x 1440 WQHD display, a laptop with the powerful Intel® Core™ M processor. ASUS Transformer Book T300 Chi is now available starting from **SS\$1,498**.

Windows 8.1 Operating System	⋮	Lightweight, Slimmest 13" 2-in-1 Core™ M Notebook at 7.6mm	⋮	Speedy Performance with Up To 8GB RAM & 128GB SSD	⋮	Up To 10 Hours* of Daily Mobile Performance
---------------------------------	---	---	---	--	---	--



For more information on specifications,  
please refer to [www.asus.com/sg](http://www.asus.com/sg).

\*Battery life is subject to usage configuration.

Intel®-based 2 in 1s. A tablet when you want it, a laptop when you need it.

Intel, the Intel Logo, Intel Inside, Intel Core, and Core Inside are trademarks of Intel Corporation in the U.S. and/or other countries.





Quality. Promised.

Canon

Delighting You Always

# ONE PRINTER CONNECTS THEM ALL.

PIXMA: the easier way to print from multiple devices



#### PIXMA PRINTING SOLUTIONS

Lets you print from, and scan to, your mobile device over a wireless network.



PIXMA Touch & Print

#### PIXMA TOUCH AND PRINT

Lets you print from your NFC-enabled mobile device with a simple tap on the printer.



PIXMA MG7570

Available in 3 colours



Access Point Mode



PIXMA Cloud Link



Wi-Fi CERTIFIED



Print From Email



mopria



AirPrint



Singapore's Best-Selling  
Printer Brand 2003-2014  
(Based on Consumer Retail  
Audit Reports in Units)

Find us on Facebook  
Canon Singapore

Canon Singapore Pte. Ltd.

For product enquiries: 6799 8888 (Mon-Fri: 8.30am - 5.30pm) [www.canon.com.sg](http://www.canon.com.sg)



## WHAT MAKES TECH TICK?

Technology had permeated the everyday products that we use, but I often find that we still have a very limited view of how it defines these very gadgets. Take for instance the digital camera. The progress and innovation in digital imaging over the past decade is nothing short of stunning. And yet, consumer perception of performance remains fixated by the one feature that, in my opinion, has the least effect on image quality in any modern camera. Yes, I'm talking about those darn megapixels.

Cameras are a classic example, but other products have their share of success and failures in 'breaking the mold' so to speak.

TVs are known for resolution and size, but it already is at a limit. 4K TVs have become standard and 8K is around the corner, but still to the dearth of any actual 4K content. To this end, manufacturers have been trying very hard to associate the TV experience with other features such as 3D, smart connectivity and most recently curved screens.

Audio is one that's interesting to watch. On one hand, we've transcended physical media with High Resolution Audio and wireless streaming. The CD is as

good as dead. On the other hand, the vinyl resurgence is making a killing.

Microprocessors succeeded the megahertz race with the advent of multi-core and multi-threaded computing. Today, it's all about efficiency in doing more while consuming less power rather than raw speed and huge heat sinks.

And mobile phones represent the most dynamic industry that technology has ever produced. The smartphone today is a camera, a screen, an audio player and computer all rolled into one. Of course, it's a phone too, but that seems secondary these days.

What I'm really trying to say, is that if you think tech gadgets have become repetitive or formulaic, there's a lot going on than that one big feature or number that marketers continually bombard you with. A camera is more than its megapixels, a TV is more than a screen and a smartphone is more than just Apple vs Android.

And I just happen to know the only tech mag you can get your monthly geek on. You're already holding it.

**Zachary Chan**  
EDITOR



# PROLiNK®

www.prolink2u.com

## PROTECT YOUR COMPUTING EQUIPMENT!

With Reliable  
**Power Backup**  
Products from  
PROLiNK®

Your Inspirations.  
Our Innovations.

2 Years  
Local Warranty  
24 Years of Industry Expertise

More than a million  
UPS units sold

Used and Trusted by Companies  
in Asian and African regions

Quality Tested and  
Reliable Products



Medical  
Devices



Household  
Equipment



PC



Printer



Work Stations/  
Servers

Line Interactive UPS (650 – 1000VA) • Online UPS (1 – 210kVA) • IPS Inverters • Solar Inverters

Manufactured by **Fida International (S) Pte Ltd.** Email: [sales@fida.com](mailto:sales@fida.com) Tel: **+65 6357 0668**

Service Center: **Block 16 Kallang Place, #06-02, Singapore 339156** Technical Support: **+65 6357 0666**

Distributed by **AceCom Technologies** Hotline: **+65 6228 2590 / 9746 2748**

Sales Enquiries: [menghong@acecom.com.sg](mailto:menghong@acecom.com.sg)

PROLiNK is a trademark of Fida International (S) Pte Ltd and is manufactured under its authority. Microsoft, Windows and Windows 7 are trademarks of the Microsoft group of companies. Intel, Intel logo, Intel Atom Inside are trademarks of Intel Corporation in the U.S and other countries. Other trademarks, registered trademarks, and/or service marks, indicated or otherwise, are the property of their respective owners. Price, promotions, design and specifications, if any, are subject to change without prior notice. Images shown are for illustrative purposes only. © Copyright 2015. PROLiNK All rights reserved.



FACEBOOK



TWITTER



YOUTUBE



WEBSITE



# CONTENTS

M A R C H 2 0 1 5

## THINK

### 41

- SMART OLD WATCHES
- WHY COMPANIES BREAK UP
- AR: THE FUTURE OF WEARABLES

## IMPACT

### 47

- JANICKI BIOENERGY OMNIPROCESSOR

## Q&A

### 48

- CRAIG DAVIS, WD

### 50

- YOSHIYUKI NADA, OLYMPUS

# 41

THINK

## FEATURES

### 53

- TECH THAT DRIVES PHOTOGRAPHY

### 59

- 2015 ULTIMATE OFFICE PRODUCTIVITY GUIDE

### 110

- HOW XIAOMI ROLLS

## FOLLOW US



hardwaremag.com



facebook.com/  
hardwarezone



twitter.com/  
hardwarezone



youtube.com/  
hardwarezonecom

### HWM CONTEST GENERAL TERMS & CONDITIONS:

**1** All contests published in HWM are open to all Singapore residents except employees of Singapore Press Holdings Limited, the sponsor, their media agencies and contractors. **2** SPH Magazines Pte Ltd's decision on the winner shall be final. Winner will be notified by post, email or phone. **3** Prizes are given at SPH Magazines Pte Ltd's and sponsor's discretion and subject to stock availability. Prizes offered are not transferable, exchangeable for cash or any other products and may be substituted with any gift or prize of similar value. **4** Taxes, shipping charges, insurance costs and other expenses not specified herein and imposed on the prizes are your sole responsibility. **5** Prizes not claimed by the winner within 45 days after the announcement made in HWM will be forfeited. **6** SPH Magazines Pte Ltd

shall be entitled to use your name, photograph and all information submitted by you for future advertising/marketing/promotional activities without further compensation to you. **7** SPH Magazines Pte Ltd and the sponsor shall not be liable for (i) late, lost, incomplete, illegible or unintelligible entries; (ii) any loss or damage suffered by you or any party in accepting, possessing, using or consuming any of the prizes or entering the contest; or (iii) any printing or typographical errors in any materials associated with the contest. SPH Magazines Pte Ltd reserves the right, in its sole discretion, to suspend or cancel the contest at any time. **8** By sending your entry to the contest/promotion, you agree to be bound by all these terms and conditions. **9** For mail-in entries, only original coupons will be accepted.



HP recommends Windows.

# 2-in-1. The only 1 your business needs.

**HP Mobility. Built for the ways you work.**

Introducing the 2-in-1 that combines the convenience and mobility of a tablet with the security and strength of a notebook. With Intel® Core™ M processor, dual batteries, accessories for every need, and outstanding durability, this is the one device that does it all.

What's more, give your team the freedom to print to office devices with HP's mobile printing software solutions and services, with the security features IT managers demand. HP's Wireless Direct and Touch-to-Print features let you print from your mobile devices without connecting to any network.

To find out more, contact us at [HP@ITknowledgeZone.com](mailto:HP@ITknowledgeZone.com) or call **1800 430 3705** (9.00am - 6.00pm, Mon - Fri).



**HP Elite x2 1011 Tablet**

**Purchase with purchase productivity accessories to complement your tablet:**



**HP ElitePad HDMI/VGA Adapter at \$69**



**HP Advanced Wireless Dock at \$249 (worth \$400)**



**HP Elite x2 1011 Travel Keyboard at \$299 (worth \$450)**



**Care Pack**

**Upgrade to HP 3 years Travel Next Business Day Onsite Warranty at \$349 (worth \$500)**

# CONTENTS

MARCH 2015



**11**  
GEAR



**53**  
FEATURE



**59**  
FEATURE



**82**  
TEST



**50**  
Q&A



PHOTOGRAPHY **DARREN CHANG**  
ART DIRECTION **KEN KOH**

All prices quoted in this magazine  
are in Singapore Dollars (SGD),  
unless otherwise specified.

**11**

## GEAR

Cutting-edge Technology

**78**

## GEEKLIFE

Everyday superheroes

**81**

## TEST

APS-C CAMERAS

- Canon 7D Mark II
- Fujifilm X-T1
- Samsung NX1
- Sony SLT-A77 II

**94**

AC2400 ROUTERS

- ASUS RT-AC87U
- Netgear Nighthawk X4
- Linksys E8350

**101**

REVIEWS

- ASUS ROG G751JT
- Casio G'Mix GBA-400
- MSI GT80 2QE Titan SLI
- Resident Evil HD Remaster
- Sony Bravia KD-65S9000B
- Xiaomi Mi Note

**115**

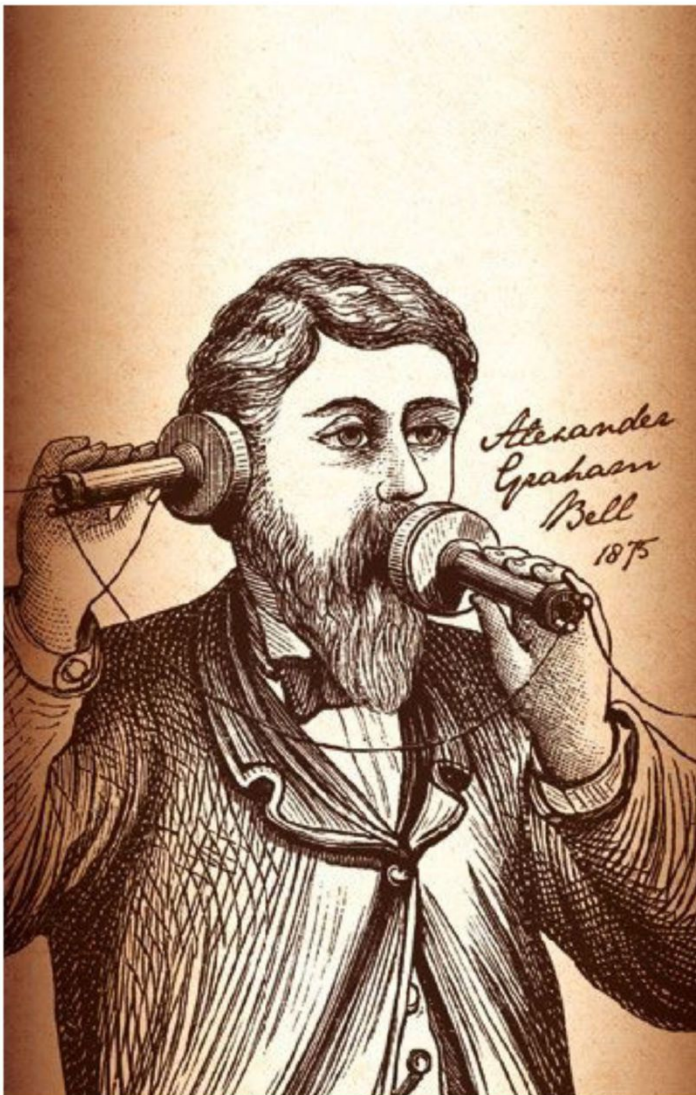
## LEARN

- The Playstation second screen experience
- Moving your Mac iTunes library
- App Attack

**120**

## REWIND





Just as great innovators have changed the way we communicate, the **Epson interactive projector** connects you to a whole new realm of possibility.



Point



Move



Zoom



Write

# MASTERS OF INNOVATION.

Discover innovative new features that will take your presentations to the next level. With finger-touch interactivity and multi-location capabilities, Epson interactive projectors let you challenge the boundaries of creativity and collaboration.

Redefine the way you communicate with Epson interactive projectors.



[www.epson.com.sg/interactive](http://www.epson.com.sg/interactive)

**ENGINEERED FOR BUSINESS**

SINGAPORE 65 6586 3111 | INDONESIA 62 8121137766 | PHILIPPINES 632 7062609 | MALAYSIA 03 5521 5888 | THAILAND 662 685 9899

Join us on EpsonSEA @EpsonSEA EpsonSoutheastAsia Epson Southeast Asia

**GROUP EDITOR-IN-CHIEF**  
CAROLINE NGUI nguisc@sph.com.sg

**GROUP EDITOR**  
JIMMY TANG jmtang@sph.com.sg

**EDITORIAL**  
(editorial@hardwaremag.com)  
**Editor**  
ZACHARY CHAN zachchan@sph.com.sg  
**Deputy Editor**  
NG CHONG SENG csng@sph.com.sg  
**Associate Editor (Creative Services)**  
ALVIN SOON asoon@sph.com.sg  
**Senior Tech Writers**  
JAMES LU jameslu@sph.com.sg  
KENNY YEO kennyee@sph.com.sg  
MARCUS WONG cwmwong@sph.com.sg  
**Tech Writers**  
WONG CHUNG WEE wongcw@sph.com.sg  
SALEHUDDIN HUSIN salh@sph.com.sg

**EDITORIAL SUPPORT**  
**Senior Manager, Administration and Editorial Support Unit**  
JULIANA CHONG julianac@sph.com.sg  
**Manager**  
ALICE HAN tayaha@sph.com.sg  
**Coordinator**  
YOLANDA ZHUANG yolandaz@sph.com.sg

**CREATIVE**  
(creative@hardwaremag.com)  
**Associate Creative Director**  
JAYSON ONG jaysono@sph.com.sg  
**Art Director**  
KEN KOH kenkoh@sph.com.sg  
**Graphic Designer**  
IAN CHONG ianchong@sph.com.sg  
**Chief Photographer**  
VERONICA TAY verontay@sph.com.sg  
**Executive Photographers**  
FRENCHESCAR LIM frenchl@sph.com.sg  
TAN WEI TE tanweite@sph.com.sg  
**Photographers**  
DARREN CHANG darrenc@sph.com.sg  
JASPER YU jasperyu@sph.com.sg  
VEE CHIN veechin@sph.com.sg  
VERNON WONG vernwong@sph.com.sg  
WINSTON CHUANG wchuang@sph.com.sg  
WONG WEI LIANG wongwl@sph.com.sg  
ZAPHS ZHANG teolc@sph.com.sg  
**Editorial Support Executive**  
JACQUELINE YIK jacyik@sph.com.sg

**MANAGING DIRECTOR**  
DENNIS PUA dennisp@sph.com.sg

**GENERAL MANAGER**  
PANG LEE CHENG panglc@sph.com.sg

**ADVERTISING SALES**  
(sales@hardwaremag.com)  
**Associate Ad Sales Director**  
KEVIN FOO kevinfoo@sph.com.sg  
**Senior Account Manager**  
FION YIP fionyip@sph.com.sg  
**Account Manager**  
SAMANTHA CHUA samchua@sph.com.sg

**MARKETING**  
**Team Head**  
VICKY YONG yongwmv@sph.com.sg  
**Executive**  
TEN HUI LING tenhl@sph.com.sg

**PUBLISHING SERVICES**  
**Team Head**  
ALICE CHEE siewyuen@sph.com.sg  
**Team Leader**  
LISA YONG lisayong@sph.com.sg

SPHmagazines

**CHIEF EXECUTIVE OFFICER**  
LOH YEW SENG lohys@sph.com.sg

**STRATEGIC DEVELOPMENT DIRECTOR**  
FOONG SEONG KHONG foongsk@sph.com.sg

**PUBLISHING SERVICES DIRECTOR**  
LEONG TSCHENG YEE leongty@sph.com.sg

**CORPORATE COMMUNICATIONS HEAD**  
CHIN SOO FANG soofang@sph.com.sg

**VICE PRESIDENT, HUMAN RESOURCES**  
IRENE LEE leebl@sph.com.sg

**INTERNATIONAL LICENSING**  
PANG LEE CHENG panglc@sph.com.sg

## INTERNATIONAL OFFICES

**Indonesia Rep. Office**  
Martin Wijaya (Chief Editor)  
PO Box 6169 JKUPL 14440  
Jakarta, Indonesia  
Tel: (62) 21 612 0233/0955  
Fax: (62) 21 6220 2580  
Email: info.id@hwzcorp.com

**Malaysia Rep. Office**  
Michael Low (Editor)  
Lot 7, Jalan Bersatu 13/4,  
section 13 46200 Petaling Jaya  
Selangor, Malaysia  
Tel: (60) 3 7952 7000  
Fax: (60) 3 7960 0148  
Email: sales.my@hwzcorp.com

**Philippines Rep. Office**  
Marvin R. Velasco (Editor)  
Unit B-2, Topy Main Building, No. 3  
Economia Street, Bagumbayan,  
Quezon City 1110, Philippines  
Tel: (63) 2634 9179  
Fax: (63) 2634 9180  
Email: sales.ph@hwzcorp.com

**Taiwan Rep. Office**  
Dennis Chou (Asia Media Contact)  
2F-2, No.35, Sec 2,  
Fushing South Road,  
Taipei 106, Taiwan  
Tel: 886-2-8773-4199  
Fax: 886-2-8773-4200  
Email: sales.tw@hwzcorp.com

**HWM (HardwareMAG®) is published by SPH Magazines Pte Ltd.**  
82 Genting Lane, Media Centre Level 7, Singapore 349567 Tel: (65) 6319-6319,  
Fax: (65) 6319-6227. Ad Sales enquiries Tel: (65) 6319-6326

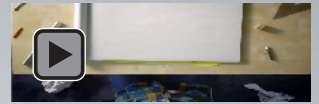
Distributed by Circulation Department, Singapore Press Holdings Ltd. Printed by timesprinters, Singapore registration no. 196700328H. SPH Magazines registration no. 196900476M, ISSN 0219-5607, MCI (P) 060/02/2013

All rights reserved. No part of this publication may be reproduced in any form or by any means without the written permission of the publisher. The views and opinions expressed or implied in HardwareMAG are those of the authors or contributors and do not necessarily reflect those of the publisher.

Call 6388-3838 for back issues, E-mail: circs@sph.com.sg.  
Subscription Hotline: 6388-3838 or subscribe online: www.hardwaremag.com



Dell recommends Windows.



## It leaves room for everything except the competition.

Sure, being the world's smallest 13" laptop looks impressive, but its size is just the beginning. With the world's first virtually borderless infinity display, available with UltraSharp™ QHD+ resolution, up to an Intel® Core™ i7 processor, Windows 8.1, up to 15 hours of battery life\* and built with carbon fiber and machined aluminum, the new XPS 13 is amazing both inside and out. Which is great news for everybody — unless you're the competition.

The new Dell XPS 13. Better by any measure.



\*Battery Life based on BrowsingBench test run by Dell in November, 2014. Visit [www.eembc.org](http://www.eembc.org) for more information. System had 150-nits (40%) brightness, WiFi on, 4GB memory, Intel HD 5500 graphics, Intel Core i5 processor, 128GB SSD and FHD display. Test results should be used only to compare one product to another and are not a guarantee you will get the same battery life, which may be significantly less than test results and varies depending on product configuration, software, usage, operating conditions, power management settings and other factors. Maximum battery life decreases with time and use. Dell XPS 13 is a trademark of Dell Inc. Intel, the Intel Logo, Intel Inside, Intel Core, and Core Inside are trademarks of Intel Corporation in the U.S. and/or other countries. Dell, the Dell logo and the Dell badge are trademarks of Dell Inc. ©2015 Dell Inc. All rights reserved.

5th Gen Core: Premium performance, stunning visuals.



Visit us at [Dell.com.sg/HomeDeals](http://Dell.com.sg/HomeDeals) Dell Exclusive Store at Funan DigitaLife Mall #03-26 109 North Bridge Road Singapore 179097. Operation hours : Mon — Sun 11am to 9pm Phone: 1800-394-7486

Participating retailers:



S A M E D A Y T E L E C A S T A S T H E U . S .

# V I K I N G S

NO MERCY. NO RETREAT. NO SURRENDER.  
PREPARE TO BE CONQUERED.



**H**  
**HISTORY.**

StarHub TV Ch 401

**New Season**  
**Fridays 10pm**  
**Encores Sundays 10pm**

Facebook & Twitter: HistoryAsia  
#Vikings



# NEW THIS MONTH

Every month, we receive dozens of product announcements and mentions, sit through many a launch event and try out all kinds of devices. All these products are then carefully curated by our crack team of tech gurus. The final list is presented here in Gear and it is our hope you'll find something to geek-out to.



## MORE INSIDE >

**SAMSUNG SUHD TV JS9500**  
Curved. Quantum dot. 4K. Tizen.

**RAZER NABU X**  
Gamers need exercise too.

**SONY SMARTWATCH 3**  
Now in swanky stainless steel.

**NIKON D5500**  
So light. Much compact. Wow pictures.

## MICROSOFT HOLOLENS

Going beyond the confines of VR goggles, the HoloLens intends to bring holographic technology into the real world. Imagine three dimensional objects that you can interact with with your hands. And it's not just limited to interacting with menus; think design, productivity, entertainment and gaming. Now, this is the future.



## CREATIVE SOUND BLASTER X7 LIMITED ED.

The X7 Limited Edition is designed in an exclusive pearl white color, and built with a high-resolution external USB DAC and 100W audio amplifier. They have also specially engineered the headphone amplifier circuit with a lower output impedance of 1ohm, accommodating the most demanding high-impedance studio headphones to the most sensitive low-impedance in-ear monitors.



## HONDA NSX

Finally, after years of waiting, Honda has finally resurrected its legendary NSX supercar. The new NSX is packed with bleeding edge technology and will be powered by a twin-turbocharged V6 engine along with an advanced hybrid drivetrain consisting of three electric motors - one each for the front wheels and a main motor for the rear. Although Honda will only reveal power figures closer its launch this summer, it has however hinted that power will be in excess of 550hp.



## SAMSUNG SUHD TV JS9500

Who says TVs can't be sexy? Hot from CES 2015, the Samsung JS9500 curved 4K TV has chamfered bezels, an elegant frame, and even a textured shirring design on its back. Powered by a new Tizen smart TV platform, it also uses Samsung's proprietary nano-crystal technology (a.k.a. quantum dot technology) to realize a brighter picture, with better contrasts and colors.







## AF-S NIKKOR 300MM F/4E PF ED VR

By incorporating a Phase Fresnel (Fray-nell) lens, Nikon has managed to create the world's lightest 300mm lens at a mere 750g, almost half the weight of regular 300mm primes. Plus, there's no compromise to optical quality, as it also has Extra-low Dispersion (ED) glass elements and Nikon's Nano Crystal Coat to minimize ghosting and chromatic aberration.



## SONY WALKMAN NWZ-A15

Weighing in at just 66g, and measuring just 43.6 x 109 x 8.7mm, the Sony NWZ-A15 is the world's smallest High Resolution Audio player, and it comes chock full of features. A microSD slot allows you to easily add to the 16G of in-built storage capacity, while the on-board battery will give you 30 hours of HRA playback and 50 hours of mp3 playback - plenty to get you through the day.



## RAZER NABU X

The Razer Nabu X is an entry-level wearable consisting of a water resistant sensor module fitted into a rubber wristband.

It uses three colored LED indicators and vibrations to alert users of any notifications received on a paired iOS or Android smartphone and also includes an accelerometer for activity tracking.





## SONY SMARTWATCH 3 STAINLESS STEEL EDITION

The Sony SmartWatch 3 now comes in beautiful stainless steel. The rest of its specs remain similar: 1.6-inch 320×320 TFT LCD Transflective display, Qualcomm chipset and IP68 water resistance. To further broaden its wearing styles, a new holder will allow users to customize the SmartWatch 3 with any standard 24mm watch strap.



## NIKON D5500

Currently the world's smallest, lightest, and slimmest DSLR, the D5500 boasts wireless connectivity, a vari-angle LCD monitor with touch control, and a 24.2-megapixel sensor that's been designed without an optical low-pass filter for optimum sharpness. Plus, it does full HD 1080/60p video with up to ISO 25,600, ensuring you'll be able to get excellent footage in even the dimmest of light.





## CANON POWERSHOT SX710

Why lug a heavy DSLR with long telephoto lens when you can get a pocketable super-zoom camera that weighs a mere 269g? The PowerShot SX710 has a 20.3-megapixel sensor with a 30x, 25-750mm equivalent zoom lens, does HD video and measures 112.7x65.8x34.8mm. Now that's what I call power in your pocket.

## ASUS TRANSFORMER BOOK T300 CHI

The Transformer Book T300 Chi is a sexy 2-in-1 detachable convertible powered by Intel Core M processors. It is built with a gorgeous, all-aluminum razor thin profile with a fanless design. The T300 is as fast as it is silent. Plus with its 12.5-inch WQHD (2,560x1,440) IPS multi-touch display, expect to be blown away with gorgeous visuals.





# HEAR WITH NEW EARS

Love music? Hear it in high resolution with the Sony NW-ZX2.

Imagine you'd walked around your whole life with cotton jammed into your ears. One day, a kind soul helps you to pull the cotton out, and your world overflows with sound. Birds sing with more clarity, voices become easier to understand, and even the wind rushes by your ears with new delight. And music that sounded like distant echoes now resonate with fuller notes, richer tones and brighter highlights than you'd ever heard before.

That's how the world changes when you switch over to listening with High-Resolution Audio. Ordinary music files like MP3, AAC and streaming music compress sound, throwing details away in order to reduce file sizes. High-Resolution Audio treasures those details, with truer quality than even CD audio, so you hear music as if you were standing right there next to the artists performing. Or like you were hearing it for the first time, with ears free to the world.

## LISTENING TO THE TRUTH

The Sony NW-ZX2 is a Walkman that has been designed for pure audio fidelity, with native support for High-Resolution audio, and software and hardware that have been optimized for truthfulness to the source.

Like a supercar, the NW-ZX2 has been aggressively fine-tuned for performance, with high-quality components that are typically used in home audio equipment. Even a small detail like the tin solder has been selected for 99.99% purity, so that the music sounds more natural.

## A NEW WAY TO LISTEN

There has never been a way to listen, while on the move, like with the Sony NW-ZX2 Walkman. Designing the Walkman from the inside out, with audio quality taking precedence over everything else, has resulted in the highest quality materials being used. Larger-than-usual components, usually reserved for home audio equipment, have been built into a mobile player, for the ultimate in sound fidelity.

It's unprecedented. Yet, for all the high-end technology that has gone into the NW-ZX2, it's the affecting presence of its sound that strikes you the most. Music is all about how it makes you feel, after all, and the sound that comes through with High-Resolution Audio playing on the NW-ZX2 bathes you with an entire spectrum of emotion.

It's like you're listening to your favorite songs for the first time all over again, hearing notes you've never noticed before, bringing you into deeper depths of feeling. It's a new way to hear, and like listening to the world with liberated ears.

## EXQUISITELY CRAFTED INSIDE OUT

### Designed for Sound

The NW-ZX2's aluminum alloy frame eliminates external vibrations, electrical noise and other interference so nothing interferes with the purity of the sound. A stiff, gold-plated copper chassis with low electrical resistance helps the NW-ZX2 produce clear and powerful bass, pushing the overall stretch of the high end and the heaviness of the low end.



Gold-plated copper spacer

Gold-plated copper chassis

Gold-plated copper collar



### Fine-tuned for Performance

To reproduce audio signals as faithfully as possible, the NW-ZX2 comes with two dedicated clock oscillators. One samples frequencies at 44.1kHz, 88.2kHz and 176.4kHz, specifically to reveal details from CD and DSD sound sources that might otherwise remain buried. As a result, listening to old CD encodings might reveal details that you've never heard before.



## Power to the Vocals

A strong and stable power supply helps the NW-ZX2 define smooth vocals without distortion. Seven OS-CONs (Organic Conductive Polymer Aluminum Electrolytic Capacitor) units, with several thousand times the capacity of those used in the NW-ZX1, supply clean electrical current with noises removed, for a final sound that's even cleaner. Film capacitors are used to create sharp yet not piercing sound that makes female vocals shine.

Film capacitors

OS-CONs



## Made for Higher Resolution

Superior components inside the NW-ZX2 help to increase the audio range while reducing artifacts. A large LC (inductor-capacitor) filter, of a size normally used for speaker outputs, is used for the headphone output, significantly increasing the richness of the low and high ends. High-quality MELF type resistors greatly suppresses the generation of heat noise, making it possible to express clearness, especially in the high end.



Electric double layer capacitor

MELF resistors



Clock oscillators

# 3 CAMERAS, 3 CHOICES, 1 PERFECT CAPTURE

Nikon's newest DX-format DSLR cameras make it easier to get the shot, for beginners and pros alike.



## NIKON D5500

The latest in Nikon's DX DSLR stable, the D5500 sets new standards for build quality; its incredibly slim body is reinforced with carbon fibre composite, making it uniquely light and strong at the same time. The vari-angle LCD monitor helps you shoot from creative angles while the intuitive touch controls let you easily take control of the shot. The 24.3MP DX-format sensor has been designed without an optical low-pass filter, and supports ISO100 to 25,600 for low-light photography. The built-in wireless lets you share your shots to your smart devices as soon as you take them.



## NIKON D3300

The Nikon D3300 combines high picture quality with ease of use and lightweight portability. Weighing a mere 460g (body with battery and memory card), the D3300 includes advanced features like a five frames-per-second high-speed continuous shooting mode, high ISO range of 100 to 12,800 and Full HD 1080/60p video. Experienced users will appreciate that the 24.2MP DX-format sensor comes without an optical low-pass filter for increased fidelity, while beginners will feel at ease with the camera's Guide Mode, which provides step-by-step instructions for taking great pictures.



## NIKON D7100

Your subjects may move fast but you'll move even faster with the D7100. Designed for superior subject acquisition, the D7100 comes with a high density of 51 AF points, with cross-type sensors for 15 of the most frequently used focus points. Furthermore, the 24.1MP DX-format sensor comes without the optical low-pass filter, and can capture up to seven frames-per-second. A new 1.3x DX crop feature lets you increase the angle of view to approximately 2x the focal length of your lens, letting you get closer when you need it. Despite its advanced performance, the D7100 is a compact and lightweight camera with excellent portability.





# D5500



**I AM** REACHING FOR THE SKY



**I AM THE NEW NIKON D5500.** I am intuitively designed to empower your creativity. Experience the convenience of a versatile vari-angle touch screen monitor and intelligent eye sensor, all in a stylish, lightweight and sturdy body. Capture imagery of impeccable quality with the 24.2-megapixel image sensor and EXPED 4 image-processing engine, and take advantage of the built-in Wi-Fi® for easy sharing. I am made to inspire. [www.nikon.com.sg](http://www.nikon.com.sg)

*At the heart of the image*



# SHINING LIKE THE SUN

InFocus' latest smartphones shine like the sun, have eight times the power, and take gorgeous selfies.

## INFOCUS M810

Exquisite design meets exceptional materials in the InFocus M810. Brushed metallic lines radiate from the center of its back, lending texture to its shining body, while rounded curves and cover glass soften its metal frame with an organic grip. At 6.99mm, the M810 is so slim that you don't even feel it. A 5.5" FHD displays crisp and clear visuals, while a Snapdragon S810 Quadcomm chip and iCatch individual media processor deliver strength for any task. With 4G LTE, you can roam freely and capture the world with the high-resolution 13MP main camera.



## INFOCUS M2

Take the perfect high-resolution selfie, whether with the front or back camera, using the InFocus M2 smartphone. Both front and back cameras shoot 8MP high-quality images with a fast f/2.2 aperture. Auto-focus as quick as 0.37 seconds provide clear and sharp images, whether you're holding the phone up close or you're shooting subjects far away. With a rich 355ppi 4.2" display you'll enjoy your photos in vivid definition, and with 4G LTE support you'll be sharing your images in no time.



## INFOCUS M330

Get eight times the power with the InFocus M330's octa-core A7 1.7GHz processor. Combined with a quad-core graphics processor that goes up to 700MHz, the M330 can handle anything you throw at it, including smooth streaming for Full-HD 60fps video. The generous 3,100mAh battery gives you up to 400 hours or more of 3G network standby time and more than seven hours of HD video playback. A 13MP back camera lets you take detailed shots and the 8MP front camera provides gorgeous selfies.





BRILLIANTLY CRAFTED.  
OUTSTANDING CAPABILITIES.



M330



M2

- |             |  |
|-------------|--|
| <b>M810</b> | <b>OS:</b> Android Jelly Bean 4.4 KitKat • <b>Processor:</b> Quad-Core 2.5GHz • <b>Camera:</b> Main 13MP BSI, Front 5MP BSI • <b>Screen:</b> 5.5FHD • <b>Memory:</b> 16GB (ROM) / 2GB (RAM), Support Micro SD Extension to 64GB  |
| <b>M330</b> | <b>OS:</b> Android KitKat • <b>Processor:</b> MT6592 • <b>Camera:</b> Main 13MP BSI, Front 8MP AF Octa Core 1.7GHz • <b>Screen:</b> 5.5"IPS HD (720 X 1280), Gorilla 2 Full lamination Anti-Scratch Tempered glass • <b>Memory:</b> 16GB ROM/2GB RAM (DDR3), support Micro-SD up to 32GB • |
| <b>M2</b>   | <b>OS:</b> Android KitKat • <b>Processor:</b> MSM8926 Quad Core 1.2GHz • <b>Camera:</b> Main 8MP AF (with flash LED), Front 8MP AF (with flash LED) • <b>Screen:</b> 4.2" WXGA (1280X768) 2/ capacitive touch • <b>Memory:</b> 8GB ROM/16GB RAM support Micro SD up to 64GB                |



# BEYOND FUNCTION INTO BEAUTY

Philips presents a whole new eco-conscious take on the modern phone.

## PHILIPS M8

The Philips M8 cordless phone melds sophisticated design with premium materials. The sensually curved handset provides pure balance and comfort, with seamlessly integrated keys that have been calibrated for precise dialing. Savor calls with sound that has been graded for superb voice quality. The handset speakerphone frees you to talk hands-free; while up to 60 minutes of messages can be left on your answering machine. Talk up to 18 hours on a single charge, and when you're done with your calls, place the handset either way around to charge.



## PHILIPS MIRA

The Philips Mira presents a fresh take on the modern telephone with its unconventional yet timeless design. With a glossy yet durable and fingerprint-resistant outer shell, the handset cans have been designed for comfortable use, even during the longest calls. The Mira features an easy to read, 4.1cm 2-line graphical display, with superb voice quality and a handset speakerphone that lets you talk hands-free. With an elegant appearance from any angle, the Mira makes a fine statement in the contemporary home.



## PHILIPS LINEA

The Philips Linea is a pure line of connection. Simplicity meets elegance with a slender silhouette that takes up minimal space, and perfectly adjusted magnets make it easy to dock the handset in a stable position. A high-contrast, 4.1cm 2-line reverse display ensures easy reading, while advanced sound testing and tuning have resulted in superb voice quality. Enjoy hands-free calls with the handset speakerphone, and enjoy 16 hours of talk time on a single charge.



# Award Winning Philips Fidelio Masterpieces



Award Winning Surround on Demand Series just got even better with the new Fidelio B5 Soundbar Speaker with Stand-alone portable wireless speakers



## Surround on Demand

Submerge your listening senses in superb Dolby Digital 5.1, DTS Digital surround sound whenever you want it. Simply detach the wireless surround speakers from the main speaker unit and place them at the rear of the room to enjoy an immersive movie and gaming experience.

## Stand-alone Portable Bluetooth® Speakers

With two rear detachable speakers and a central sound bar unit, a single Fidelio B5 unit can bring music to three different places at the same time.

## Advanced Spatial Calibration Function

Ensures optimum sound balance, regardless of rear speakers placement in a room.

**NEW**



### Philips Fidelio M2L

Headphone with lightning connector  
*Ideal for iOS device lovers*

**COMING SOON**



The M2L headphones deliver Fidelio's signature sound in high resolution on your iOS device, without distortion or crosstalk, thanks to a lightning connector and built-in DAC. Enjoy pristinely detailed sound anywhere, in style.

### Philips Fidelio NC1

Noise cancelling headphone  
*Ideal for frequent travellers*

**NEW**



Enjoy superior noise cancellation with the Fidelio NC1. All you get is uncompromised high fidelity sound without the noise. Compact foldability and long-wearing comfort make it the best sound companion for long haul or daily commutes.

### Philips Fidelio M2BT

Wireless bluetooth headphone  
*Ideal for wireless listening experience*

**NEW**



At home or on the go, high definition sound and seamless Bluetooth® connectivity is all yours with the Fidelio M2BT. NFC technology ensures one-tap wireless pairing plus intuitive controls let you switch easily between music and calls.

Check in-store for more information

### Philips Consumer Care:

620A Lorong 1, Toa Payoh  
TP4 Building, Level 1  
Singapore 319762

Consumer Care Hotline: (+65) 6737 3000 (Home Audio/Video Entertainment)  
(+65) 6735 9100 (DECT, Headsets and Earphones)



Like us on Philips Sound for latest news and product update

**PHILIPS**

### SOMETHING FOR DX EXPLORERS

Weighing in at just about 300g, the AF-S DX NIKKOR 55-200MM F4-5.6G ED VR II features a retractable barrel mechanism and ED glass elements as well as a Silent Wave Motor to allow photographers to shoot perfectly sharp images, even at a distance. **AF-S DX NIKKOR 55-200MM F4-5.6G ED VR II**



### FOR URBAN RUNNERS

The Snap's unique design lets just enough ambient noise in without sacrificing audio quality; important for runners who need to remain aware of the traffic around them. With front and back vents specifically tuned for full-range sound and the implementation of a flat cable with Zound Lasso to keep things tangle free, The Snap makes the perfect exercise partner. **Coloud Sports The Snap**



### PROTECTION WITHOUT THE BULK

NewerTech's NuGuard KX ultimate protective cases comes in a slim design and features a state-of-the-art X-Orbing Gel Technology which absorbs and evenly distributes kinetic energy, providing your phone with an incredible protection without excessive bulk. Enhanced with cross hatch texture for a secure grip and hard shell exterior with soft interior, the NuGuard KX comes in four colors and is available for iPhone 4, 5 and 6 series. **NewerTech NuGuard KX**



### PERFECT GAMEPLAY

At the recent CES 2015, Aorus introduced a brand new X5 built with dual GTX 965M graphics and a 15.6-inch display. Weighing at 2.5kg, it is simply unbeatable in terms of performance to size ratio. Another feature that sets the X5 apart from the competition is also its 4K/UHD IGZO display which delivers ultra-high pixels and stunning details for unparalleled viewing experience when gaming. **AORUS X5**



## YOUR 4K POINT OF VIEW

The Sony FDR-X1000V is Sony's newest and most powerful Action Cam to date, and it's capable of shooting 4K/30p video at a bitrate of up to 100Mbps. Equipped with a Zeiss Tessar lens with an ultra-wide angle 170-degree field of view, the X1000V also features an updated SteadyShot stabilization technology for clearer and vibration-free footage. **Tt Sony Action Cam FDR-X1000V**



## TAKE CONTROL

Have you ever dreamt of being able to control all your home system through your phone? The all new iDevices Switch is the first ever certified homekit product that provides users ultimate convenience, comfort and security for their home. Own an iPhone, iPad or iPod? You can now effortlessly control, monitor and schedule products around the house via a free iDevices connected app and Siri. Designed with a custom IoT cloud, users can access their home from wherever they are with no additional hub required. It also comes in handy as a night light! **iDevices Switch**



## SURROUND SOUND ALL AROUND

The Neoh takes advantage of the fact that humans locate sounds based on the time differential between its perception via each ear. Using algorithms that have the ability to reproduce these spatial perception mechanisms, the companion music player app uses the motion sensors on the headphone to deliver true 3D sound in your head. **3D Sound Labs Neoh**

## STATUS SYMBOL

If you've ever felt like splurging US\$6,000 on a smartphone, Tonino Lamborghini's limited edition 5-inch 88 Tauri, handcrafted and built with calfskin leather and automotive-grade stainless steel isn't a bad place to start. If that's not enough incentive, each phone comes pre-loaded with 13 exclusive ringtones created by "famed" DJ and producer DJ Ravin. **Tonino Lamborghini 88 Tauri**

### CRYSTAL CLEAR AUDIO

Sony's new MDR-1 ABT headphones offer an outstanding mix of comfort with quality. Ergonomic earpads and a wraparound design offer great passive noise isolation, while the lightweight, responsive aluminum coated Liquid Crystal Polymer Film diaphragms allow for balanced sound reproduction. **Sony MDR-1 ABT Wireless Headphones**



### GREAT FOR THE OUTDOORS

This new 16.4-megapixel waterproof, shockproof, freezeproof and dustproof camera from Fujifilm is ideal for the great outdoors. Get quality shake-free shots thanks to in-camera Optical Image Stabilization and a 5x optical zoom lens that goes up to 28mm at the wide setting. There's even wireless functionality for remote shooting via the Fujifilm Camera Remote app. **Fujifilm FinePix XP80**



### GROOVY TUNES

The Luxa2 GroovyA speaker features an adjustable design for an optimal listening experience whether you're indoors or out. With 7W total output and a rechargeable 2200mAh lithium ion battery the GroovyA provides up to 15 hours of streaming audio. And it takes calls too! **Luxa2 GroovyA**



### FLAGSHIP ZOOM

X-T1 users have finally got a weather resistant standard zoom to go with their camera. Covering the equivalent of 24-85mm (in 35mm equivalent), the Fujinon XF16-55 f/2.8 R LM WR uses Nano-GI coating technology to reduce ghosting and flare, and features a linear drive motor for fast, quiet autofocus. And it works at temperatures down to -10 degrees Celsius! **Fujinon XF16-55 f/2.8 R LM WR**

## HIGH RES AUDIO TO GO

Sony's latest portable DAC and headphone amplifier, the PHA-1A has a frequency range of 10Hz-100,000Hz, and will support headphones with impedance of up to 600Ω. It weighs just 145g, and has a battery life of about six hours while needing only two hours for a full recharge, so simply hook your laptop, tablet or portable media device up via the PHA-1A's USB input and you're good to go! **Sony PHA-1A**



## KEEPING IT SIMPLE

Aimed at consumer who wants a simple smartphone without all the complications, the new IM5 from Kodak is built with a 13MP auto-focus main camera, runs on Android with an octa-core 1.7GHz CPU. The IM5 makes taking, storing, sharing and printing photos quick and simple with a unique software that comes with the phone. With a touch of the button, it allows you to quickly edit photographs, share them on social media sites and even lets you print your images using an app compatible with your printer. **Kodak IM5**



## CONNECT IT; SHARE IT

For all that our digital cameras can do these days, one thing they don't do well is share images with each other. That's why Canon's launched the Connect Station CS100, a central store with 1TB of memory that allows you to transfer images through Wi-Fi, NFC, SD/CF cards, or a USB connection. Storing and sharing images has never been easier! **Canon Connect Station CS100**



## WI-FI AUDIO EXTENDER

The DCH-M225 is a dual purpose Wi-Fi audio streamer that also doubles up as a Wireless-N range extender as well, which will help you boost your network coverage within your home. Plug it into a wall socket and as long as you're within your network range, you'll be able to stream and playback audio to any set of standard speakers via a 3.5mm plug. **D-Link DCH-M225**



### NEVER MISS A CALL AGAIN

The all new Voice Bridge is for those who want to use or share their existing fixed line number on several smartphones and tablets in the same home or office. Featuring a sleek design, the Voice Bridge can connect up to 5 iOS devices and serves as a bridge between landlines and smartphones/tablets. The Voice Bridge also has a "Follow Me" function that helps you receive notification of landline calls and allows you to use your address book for all your calls! **Swissvoice Voice Bridge**



### CARBON DREAMS

Lenovo's flagship Thinkpad X1 Carbon enterprise Ultrabook has just been updated with the latest fifth generation Intel Core processors. That aside, all models now have Full HD displays as standard as well as super fast PCIe-based SSDs. Lenovo has also listened to customer feedback and has brought back standard function keys as well as dedicated buttons for use with its TrackPoint pointing device and trackpad. **Lenovo Thinkpad X1 Carbon 2015**



### NETWORK STORAGE SIMPLIFIED

The DS115 is an introductory 1-bay NAS for those that want a centralized home or small business storage solution. This new model features an updated dual-core processor and improved read/write speeds of 111MB/s and 104MB/s - a 36% increase over its predecessor. It also features a USB 3.0 port for speedy connections with external storage drives. **Synology DiskStation DS115**



### LOOK MA, NO LAMP!

The Casio XJ-V1 is the newest generation lamp-free projector to use a hybrid laser and LED SSI (Solid State Illumination) design, which has a much longer lifespan of 20,000 hours. It is also virtually maintenance free. The XJ-V1 is an XGA DLP 3D projector with a 2,700 lumens rating, starts/stops almost immediately and achieves max brightness in just 5 seconds. **Casio XJ-V1**

### A BARGAIN SSD

The new BX100 is Crucial's newest entry-level SSD. It is also the company's first drive to use Silicon Motion's 2246EN controller. Memory is Micron's 16nm 128Gbit NAND. As it's an entry-level drive, it loses some features such as hardware-accelerated encryption and Dynamic Write Acceleration. The BX100 will only be available in 2.5-inch form factor. **Crucial BX100 SSD**



### BACK TO BASICS

Grovmade, a small Oregon-based outfit that makes handcrafted accessories for Apple products have come up with this gorgeous analog wood watch. Available in either maple or walnut wood finish, in a round or square face, the Grovmade watch features a Japanese movement and circular color block "hands" to represent hour and minute. No, it is not a smartwatch. **Grovmade Watch**



### ONLY AUDIOPHILES NEED APPLY

Sony's new high-end high resolution MDR-Z7 headphones feature some of the largest drivers in the business – 70mm to be exact – ensuring utmost clarity and deep true bass. It also supports a wide frequency range of up to a startling 100kHz and even comes with a special cable that lets it connect directly with Sony's equally new PHA-3 high-resolution headphone amplifier. **Sony MDR-Z7**

### POWER IN A CASE

If you find it inconvenient carrying an external battery pack with you, the OtterBox Resurgence Power Case is the answer. Boasting an integrated 2,600mAh battery pack, the Resurgence is designed to allow users to unplug and go further with two-times the battery life. It is built with military grade drop protection and utilizes auto-stop technology which shuts off the case when it's fully charged. **Otterbox Resurgence for iPhone 6**





H W M S P E C I A L

# GAME CHANGER

The Olympus OM-D E-M5 Mark II's radically improved 5-axis image stabilization changes the game for both videos and stills.



To find out more about Olympus OM-D EM5 Mark II, go to [www.olympusimage.com.sg](http://www.olympusimage.com.sg)



As a photographer, I've been looking for 'the one' for a while — a camera that performs like an extension of my mind that captures the world with the breadth of color and depth of texture as I see it in reality.

More and more, I'm also looking for portability, for a camera that won't wear me down as I walk through my travels, letting me turn one more corner or climb up one more ridge to see what's there. Now, it would also be great if this miracle camera were a capable video shooter, letting me capture either stills or movies as the scene sees fit.

It sounds like I may be asking for too much. And that's why the new Olympus OM-D E-M5 Mark II has me so excited.

## OM-D VIDEO: THE 'SECRET' IS IN THE 5-AXIS IMAGE STABILIZATION

Contrary to popular marketing, what most people need to shoot better-looking videos isn't more resolution. The one 'secret' that will make their videos instantly look better is simply that they need to shoot stable-looking videos.

Nothing makes a video look more amateurish — or more difficult to watch — than a shaky camera. Shooting at 4K with shaky hands doesn't help; it only makes people more aware of how dizzy your higher resolution makes them.

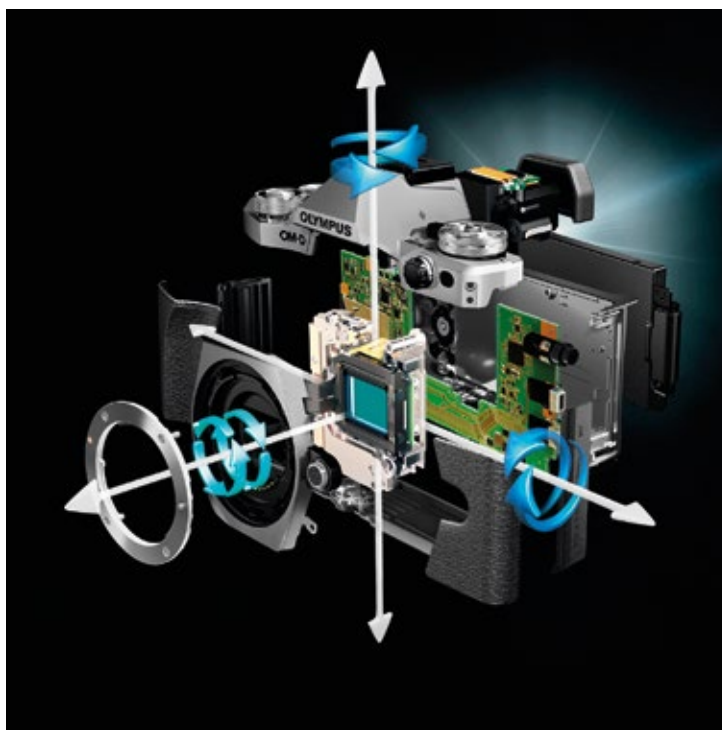
But to shoot 'professional' looking stabilized video is often difficult to do unless you carry a tripod with you and lock down the camera before every shot. Or you'll have to outfit the camera with fancy gear like handheld stabilizers, and that's more equipment you not only need to buy but also carry.

The E-M5 Mark II aims to solve this with its improved 5-axis image stabilization. The results are a revelation — and I don't use that

word lightly. Handheld video looks like it was shot on a tripod, with hardly a jitter in sight. Videos shot when walking are free from the bouncing and shaking that usually accompanies such shots, making the entire video look like it was captured with a stabilizer, when all I was doing was holding the camera with my bare hands.

The improvement is dramatic, especially when the E-M5 Mark II is tested against competing cameras with conventional image stabilizers. In those videos, camera movement is obvious, resulting in shaky, bouncing footage that will turn anyone off watching what you've shot.

I was also surprised how, just by being more stable, video from the E-M5 Mark II looked more cinematic, even without any post-processing done to it. With the 5-axis image stabilizer makes, now you don't have to be a professional to shoot professional-looking video.



The E-M5 Mark II's improved 5-axis IS can compensate for up to 5 stops.



## OLYMPUS E-M5 MARK II WITH 5-AXIS IS



## COMPETING CAMERA WITH IN-LENS IS



It's difficult to show how video image stabilization works in still pictures, but hopefully this gives you an idea. These are zoomed-in screen-captures from videos I shot when walking towards the subject, compare how the E-M5 Mark II video's still frames are clearer and less blurry than a competing camera with in-lens stabilization.

## AN ADVANCED HI RES SHOT MODE SHOOTS 40MP PICTURES

On one hand, I'm glad to see that the megapixel wars are (mostly) over, and we've moved on to other important features like image stabilization and video performance.

On the other hand, I can appreciate the extra fidelity you get from higher megapixel cameras. The problem is, I don't want to shoot everything I see at 36MP or more.

Olympus has solved this conundrum in a unique way with the E-M5 Mark II, which shoots at 16MP natively, and can also shoot 40MP on demand.

It's enabled thanks to the new advanced 5-axis IS. The camera's Voice Coil Motor (VCM) is used to systematically shift the image sensor by half a pixel's width as it takes eight shots in sequence. Moiré and color aberrations are minimized, resulting in brilliant pictures with extraordinary color and detail.

To be sure, there are certain limitations — the camera needs to be locked down on a tripod to avoid minor hand movements creating image artifacts. The subject needs to be relatively still as well, because moving subjects will also cause image artifacts.

But it's a welcome tool in your pocket to have, when you come across the perfect landscape, architecture, product shot or still life, and want that much more detail in the final shot. With 16MP, I can print just shy of A3 at good quality, but with 40MP, I can print near A2 and still have a high quality print.



Top: Shot with the 40MP mode.  
Right: A 100% crop of the 40MP shot.

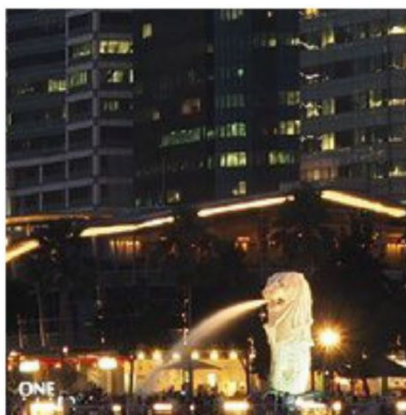


## 5-AXIS STABILITY'S NOT JUST FOR VIDEO

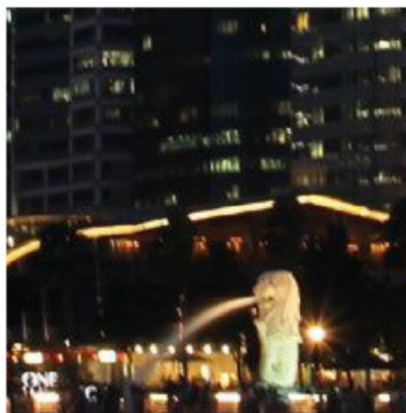
The E-M5 Mark II's improved 5-axis image stabilization doesn't just work with video, but is also remarkable for stills. This comes in handy when in shooting in low light without a tripod, as the camera needs to remain stable or else the shot ends up blurry.

Olympus' 5-axis IS is built into the camera, and can compensate for camera roll (which cannot be corrected with lens stabilization), horizontal and vertical shift, as well as for pitch and yaw.

Olympus says that it can compensate for up to 5 shutter steps, and I tried it for myself, shooting handheld in low light against a competing camera. Shooting handheld at a one second shutter speed, I got seven out of ten frames from the E-M5 Mark II tack sharp – something that should have been impossible to do normally without a tripod. Shooting with a competing camera, all but one of the ten frames at one second handheld were blurred beyond usable.



Olympus E-M5 Mark II with 5-axis IS, 1 second handheld.



Competing camera with in-lens IS, 1 second handheld.

## IT'S NOT OFTEN YOU GET TO BE FREE

It's not often you get to be free. To walk unencumbered, with light steps. To capture the world as you see it, and share it with others. To walk into any season, and know that you have the right tool to handle any situation.

The Olympus OM-D E-M5 Mark II makes me feel that way. To have a single camera for both high-quality stills, cinematic-quality video, and high-resolution pictures. All in a small, light package that manages to remain weather-resistant.

With a game-changing 5-axis image stabilization system that helps ensure I get stable stills and smooth-looking video, without having to carry bulky gear.

Best of all, as a Micro Four Thirds camera, the E-M5 Mark II enjoys a library of more than 50 different lenses from seven different brands, as well as a host of accessories. I can't wait to shoot with this one.



Text by Alvin Soon



# Prince. Queen. Kings of Leon. Everybody Wants to Rule the World.

Introducing the all NEW radio station  
**ONE FM 91.3**, playing only REAL MUSIC.  
Tune in now!



 [facebook.com/onefmsg](https://facebook.com/onefmsg)

 [@onefmsg](https://twitter.com/onefmsg)

[www.onefm.sg](http://www.onefm.sg)



ONE FM IS PART OF THE SPH RADIO NETWORK



THINK

# SMART OLD WATCHES

Smartwatches have been dubbed as the next big thing in technology, but the truth is we have seen very little innovation on that front. On the other hand, there has been no shortage of ingenious new inventions where traditional mechanical watches are concerned.

Text by *Kenny Yeo*

## MORE INSIDE > TECH BREAKUPS

Large corporations acquiring and buying over smaller companies to grow their business are a norm, but the opposite is also true. Some giants have taken to breaking down into smaller, more nimble entities as a strategy.

## THROUGH THE LOOKING GLASS

Augmented reality, not virtual reality will be the next revolution in wearable technologies...if we can finally get past the creep factor.



# TICKING AHEAD

Fueled by the need to remain relevant in the face of the impending threat of smartwatches, and also the need to differentiate themselves because of increasingly educated and discerning consumers, makers of traditional mechanical watches are looking at ways to innovate to stay ahead of both the competition and the curve.

by Kenny Yeo



Launched last year, the Swatch Sistem51 is assembled entirely by machines and only has a single screw in its movement.

When Seiko launched the world's first quartz watch, the Astron, on Christmas Day in 1969, little did mechanical watch companies know what was to be in store for them. Back in 1969, the Astron was not cheap, but it was extremely accurate - many more times so than traditional mechanical watches. And to advance the technology, Seiko made the patents available to everyone and this led to widespread adoption of quartz technology, to the point where quartz watches could be made quickly and cheaply.

This had a profound effect on the mechanical watch industry and led to what is now known as the Quartz Crisis. The Swiss, who dominated much of the watch industry, were reluctant to make quartz watches, despite the patents being opened to all, as they saw it being an affront to their centuries long tradition and craft. This would prove to be their downfall as the world soon came to embrace quartz technology, and many Swiss watch companies soon went bust.

To save the industry, the Swatch Group was formed in 1983 through the merger of ASUAG and SSIH. ASUAG was the world's largest producer of watch movements and parts, while SSIH was formed in the 1930s through the merger of Omega and Tissot. The Swatch Group then embarked on manufacturing the Swatch watches, which were inexpensive and colorful quartz watches that were designed to appeal to all age groups. These watches proved to

be a success and would provide the stepping stone for mechanical watches to prosper again.

Today, the mechanical watch industry faces a new threat in the form of digital smartwatches. And it seems that not a day goes by without a new smartwatch being announced. However, if one were to examine smartwatches closely, you would find that there has been little real innovation there.

Much of today's smartwatches are nothing more than a secondary display for your smartphone. They prompt you when you get a call, text or email, and that's about it. Without a phone, they lose much of their functions. Standalone smartwatches with fully-functional cellular connectivity also exist, but the reason why smartphone displays are getting larger is because of the increasing rich media consumption on these devices. A smartwatch, with its tiny 1-inch screen and extremely limited battery doesn't

address this usage pattern. Sports watches with built-in GPS are also increasingly popular, but most of the innovation in this space is actually on the software side - apps that better record and interpret your fitness data. Again, you'd require a smartphone, tablet or PC to actually run said apps; the watch itself is only half the equation.

So, innovation in the digital space is mostly limited to technological breakthroughs. Faster, speedier processors; sharper, higher quality displays, but we already expect this in all our tech gadgets. They

**"The mechanical watch industry now faces a new threat in the form of digital smartwatches."**



aren't exclusive to smartwatches.

On the other hand, the mechanical watch industry has never been stronger. And there have been more innovations after the quartz crisis than in the centuries that preceded it. Innovation here is driven largely by two factors. For one, there is a strong need for brands to differentiate themselves, especially in the high-end segment of the market. This is because their target audience is becoming increasingly educated and discerning. Value and innovation are key considerations when making purchases. Next, it helps that these firms are making vast profits thanks to the high margins on their watches. In 2013, Switzerland, where many mechanical watch manufacturers are based, exported over 28 million watches at an average price of US\$830 - but this number is heavily skewed by the large volume of cheap Swatch watches.

Ironically, the material that is at the heart of many mechanical watch innovations is silicon. This is the same element used to manufacture the processors that are powering untold billions of computers, notebooks, smartphones and tablets around the world. Mechanical watches are largely made up of metal parts, which are susceptible to magnetism, heat and cold, shock and wear. Silicon by virtue of being almost frictionless, hard and non-magnetic makes it the ideal material for watchmaking.

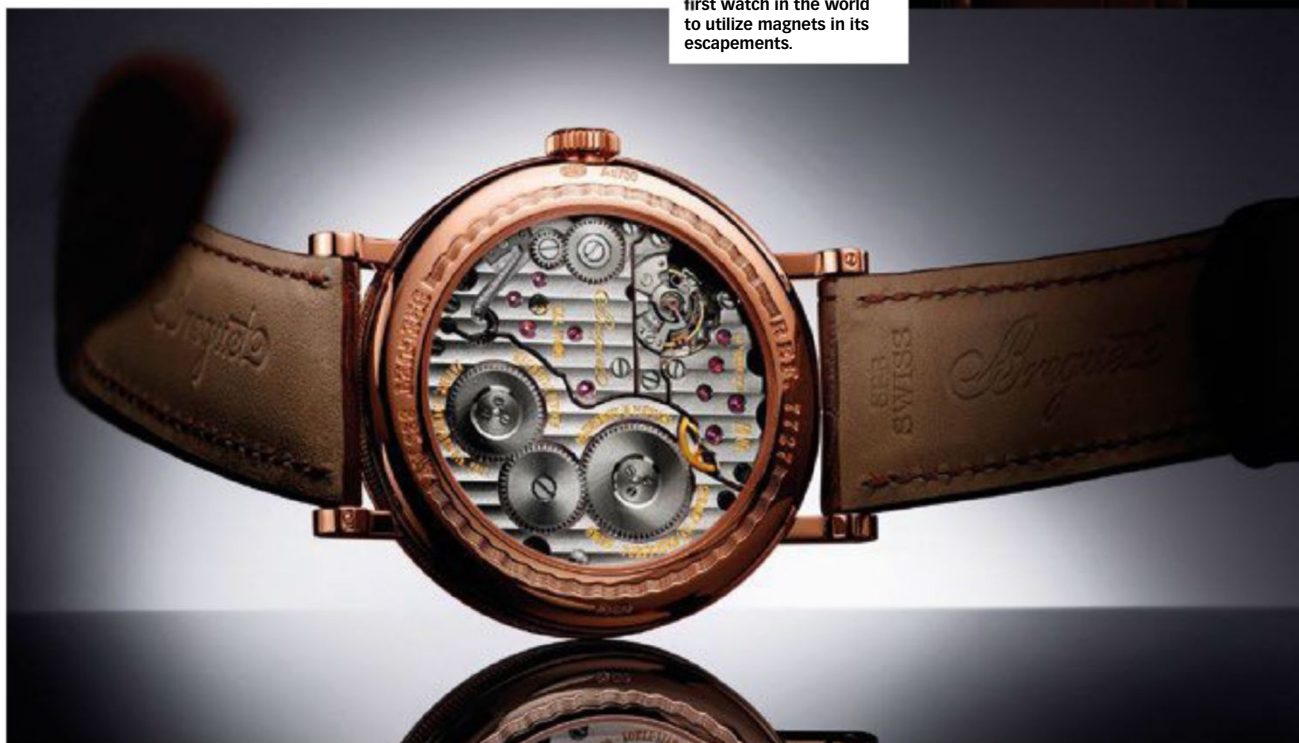
To this end, an increasing number of watch manufacturers have begun incorporating silicon into their movements. For example, Omega's new Master Co-Axial movements, which was launched last year, is made using a silicon hairspring along with other non-ferrous metals and is almost completely impervious to magnetic fields.

Last year, Vaucher Manufacturer Fleurier, a movement manufacturer partly owned by famous French label Hermes, along with the Centre Suisse d'Electronique et Microtechnique (CSEM) announced a completely new type of escapement called the Genequand escapement. To understand the gravity of this, one must know that completely new escapement designs are very rare and the level escapement, which is used in virtually every watch today, was actually invented over two and a half centuries ago.

The Genequand escapement purports to offer improved accuracy and longer power reserve - up to 30 days using a traditional



The Breguet Classique Chronométrie 7727 is the first watch in the world to utilize magnets in its escapements.



mainspring. Comparatively, a traditional mainspring typically offers only two to three days of power reserve using the lever escapement. And this is possible because of silicon. Harnessing the flexible nature of silicon, the team at Vaucher and CSEM was able to develop an escapement that uses smaller movements to regulate the unwinding of the mainspring, thus extending the power reserve. And since silicon is frictionless and unaffected by wear, they were able to increase the frequency at which the escapement oscillates and thereby improving accuracy as well.

With its qualities, silicon might look as if it is the perfect material for watchmaking, but it is still vulnerable to gravity. The accuracy of mechanical watches are affected by their resting position, this was why in the late 18th century, famous watchmaker Abraham-Louis Breguet invented the tourbillon. The tourbillon is a rotating cage that houses the entire balance wheel and as it makes a revolution, the effects of gravity is averaged out.

Breguet, who is now under the stewardship of the Swatch Group, has developed a radical new system to combat gravity using magnets. Again, silicon use is right at the heart of this innovation. Using magnetic pivots to support the balance spring, Breguet was able to create a watch that can dynamically re-center and re-adjust itself after shocks. And because the balance is essentially suspended in a magnetic field, it is completely unaffected by the forces of gravity. As a result, Breguet is able to make the watch accurate to -1 to +3 seconds a day.

Admittedly, most of these breakthroughs that are currently incorporated into watches are undeniably costly. Omega's Master Co-Axial watches start from around US\$7,000 whereas the Breguet watch that uses magnetic pivots, the Classique Chronométrie 7727, costs a cool US\$60,000. However, such innovations are likely to trickle down to the respective brands' entry-level prices, so expect prices to come down rather than go up.



Omega wants to outfit more of its watches with its new Master Co-Axial movements.





# THE SEASON OF TECH BREAKUPS

To ensure future survival, a painful split now is necessary for some companies.

by Ng Chong Seng

There's no doubt that 2014-15 is the season of tech breakups. No, I'm not referring to high profile executives leaving their companies to "try something new"; but rather, the splitting of companies from a whole to two or more entities.

The ability to better strategize and compete in the market is one of the most often cited advantages for pursuing a breakup. In layman's parlance, it usually means one division or business within a company is slowing the other down, so they're better off going their separate ways. Consider eBay Inc., which has decided to separate eBay, its e-commerce platform, from PayPal, its payments business by the second half of 2015. Such a move was untenable just a year back, simply because of the symbiotic relationship between the two, and the fact that PayPal has so much to gain from sticking with eBay (e.g., the convenience of eBay sellers and buyers being its customers too).

But times are a-changin'. With eBay transactions now forming just about a quarter of PayPal's business, PayPal's reliance on eBay is decreasing each passing day. In fact, PayPal is currently growing at a faster rate than eBay. And while this may sound like everything is still rosy, let's not forget this could change overnight, especially when you consider the increased competition in the payments industry (think Stripe, Square, Alipay, and yes, Apple Pay). Whichever way you slice it, the eBay-PayPal split looks justified. Credit goes to the eBay's board for

trying to do something before sh\*t happens.

But some breakups are harder to understand. I'm referring to HP, which aims to separate its corporate hardware and services business from its PCs and printers business by the end of fiscal 2015. Part of CEO Meg Whitman's five-year turnaround plan to bring the struggling computer maker back to relevancy, this spin-off is harder to comprehend from the outside because HP's enterprise division and

PCs and printers divisions rarely overlap, which suggests this move is less about one group hindering the other. To me, it sounds more about enabling higher organic growth, which is easier for smaller companies, because they've fewer products to focus on, products that tend to under-perform when they're part of a huge portfolio.

It's about changing perceptions too. Think of it this way, instead of staying together and be viewed as a dinosaur (by both consumers and investors), perhaps it's wiser to re-group based on core competencies, and regain the

startup mindset, so that each company can once again make a name for what it's best at. The same reasoning may well apply to Symantec too, which in October 2014 announced that it'll be splitting into two: one to focus on security, and the other on information management.

Businesses always aim to grow. For some, a breakup is the best way forward. For others, it's mergers and acquisitions. But that's for another story.

**"The ability to better strategize and compete in the market is one of the most often cited advantages for pursuing a breakup."**



# THROUGH THE LOOKING GLASS

Can augmented reality be the breakthrough wearables need?

by Salehuddin Husin

Any sufficiently advanced technology is indistinguishable from magic. That's one of Clarke's Three Laws. What it means is that the technology we take for granted today (WiFi, smartphones, the video games) may seem like ludicrous science fiction if you'd describe them to somebody from a hundred or so years ago.

Now take a moment and think. Isn't that exactly what wearables are? Who (apart from science fiction writers) would have thought that one day we would be wearing what would amount to supercomputers strapped to our wrists? Wearables like smartwatches, which were previously only seen in movies is rapidly coming when they'll be an integral part of daily life.

Unlike smartwatches though - which many have conceded to have limited functionality - eyewear and headgears seem to be where the money is. Mankind has always fiddled with visual enhancements as it directly affects one of our major senses. From black and white to full color, from 2D to 3D, and now virtual reality. However, these are all passive technologies.

What you should really be excited about is Augmented Reality or AR for short. Right now, AR describes having a digital overlay over our natural vision. Using glasses or lenses, a transparent screen is placed in front of our eyes which then transmits information, superimposing over what we see. Interestingly, this concept is very similar to the HUD (Heads-up Display) used in almost all videogames.

At its most basic level, Augmented Reality can deliver an astounding amount of information right to your eyes like weather forecasts or your playlist without needing to look away at a second screen, just for a start. It will one day be possible to know if somebody (perhaps your son or your spouse) has a fever just by

looking at them through an AR lens. Through skin temperature and other visual signs, your AR device could connect wirelessly to medical databases and then relay that information back to you in real time.

AR won't just be relegated to private use either. Entire fields and industries will be revolutionized when AR adoption becomes widespread, which will spur other avenues of research and accompanying technologies too. Learning things will suddenly take on a whole new meaning as you can apply virtual knowledge with real-time consequences instead of just theories.

Here's an example. Medical students, for one, won't have to waste time and resources on cadavers or even dummies to practice their craft. With AR, there's no limit on where and when somebody can choose to do a virtual operation. How many lives have been lost due to incompetence or inexperience of a medical professional? Of course, virtually operating on somebody and doing it for real are two different things but it's better than just have them reading books, right?

In the meantime, we'll have products like Google Glass to see where societal boundaries are concerning visual augmentation. While the technology was sound, the product was a little ahead of its time and thus, doomed for failure simply because of the associated intrusion

of privacy where people are in constant fear of being recorded.

This is an issue that needs to be soundly put to rest before AR can move forward as any sort of HUD will probably require a camera for any sort of visual feedback. After all, how can your glasses give you information about something if it can't see and process what you're looking at? The backlash from privacy issues has prompted many companies to either take their technology in a whole new direction or scrap it entirely. Rumors have it that Sony's upcoming VR headset (Project Morpheus) once incorporated AR too in some way but was dropped due to the Google Glass fiasco.

That isn't fazing Microsoft. Their HoloLens AR glasses make use of a camera to project holographic images on to surfaces. The camera also serves as a camera for another person, as a demo shows a technician teaching somebody how to fix a drain via video chat. The only way that works is if the technician's actually seeing the drain in real time, which (you guessed it) means a camera's transmitting the image. So will it get into the same kind of trouble that Google Glass did? From early indications, it would seem not (the public and the tech world seem to be enamored with it) but it's still early going for the device. After all, Google Glass was the darling of its time too and look how that turned out.

"At its most basic level, Augmented Reality can deliver an astounding amount of information right to your eyes..."



# JANICKI BIOENERGY OMNIPROCESSOR

by Salehuddin Husin

How would you like to drink clean water made from human waste? Yes, it sounds disgusting but what if there's no adverse impact and the water is as clean (even cleaner possibly) as tap water? Now, this isn't a new concept. Singapore has its own NEWater treatment process for a similar purpose, with the first plant operational since year 2000. However, the NEWater process firstly requires already treated used water as its source, not raw sewage sludge.

That's what the Janicki OmniProcessor claims to be able to do – up to 14 tons of waste a day to be exact. The OmniProcessor combines an incinerator, water filtration system and steam power plant. It's almost self-sufficient as each component feeds and powers the other, so the process itself is eco-friendly. Besides treating sewage into drinkable water, it serves a

secondary purpose of also generating electricity.

With financial backing from the Gates Foundation, it could potentially save countless lives in developing countries or locations where clean water is hard to access. A single plant is supposedly capable of treating water for up to 100,000 people. Also, resource strapped countries could usher in a self-reliant era, and potentially generate a source of income selling excess energy created from waste recycling.

The OmniProcessor has already been deployed to Dakar, Senegal to test its capabilities in the real world. If everything goes well, Janicki Industries already has plans for a wider rollout in Africa soon. The machine will not only usher in a new age of waste reclamation, it could also help save millions of lives in areas where clean water is scarce or impossible to find.



# Storage Insights

CRAIG DAVIS  
DIRECTOR OF SALES & MARKETING FOR BRANDED  
PRODUCTS IN APAC, WESTERN DIGITAL

by *Kenny Yeo*

**The new My Cloud EX systems seem to be all about making NAS user-friendly, how have consumers reacted to them?**

The My Cloud products are being extremely well received. And according to data from NPD for the U.S., we are number one now in NAS storage in the United States. The reason why it's been really well received is that because we have made it easy to use. And if you make a product easy to use then people are going to adopt and use it. If it's too difficult then it's not going to be well liked. Our whole mantra inside the organization is to make, not just our NAS products, but to make everything we put out easy to use. And with the My Cloud series, you will see newer generation products coming down the track that are going to be even easier to use.

**You've mentioned that WD can really be thought of as a software company today. How is this so?**

Inside WD, we have a (dedicated) team of engineers and their focus is developing the software, improving the software and improving user experience. A lot of other organizations outsource that to different companies to do that sort of work for them, but we do it all in-house ourselves. It pretty much like the Apple eco-system to a certain degree. Apple keeps it all very

enclosed and we are doing the same thing. In that way, we can control the user experience.

**Can you describe the market for personal cloud storage? Do you think it is still in its infancy?**

I think Gartner is coming out to say that in 2015 they expect to see the market to grow considerably. And I think it is really coming down to us as a manufacturer to start to educate the market a little bit about cloud. I think the market is starting to learn more about the cloud. We are hearing a lot about the public cloud being hacked. People are little bit wary now about the cloud and what is the actual cloud. We are doing a bit of education around the personal cloud. We are saying, "Hey this is a cloud of your own." And if you are look at some of the marketing material we got, you are creating videos and stuff that are really highlighting the personal cloud message. It's your own cloud, safe and secure, rather than have all your information at a third party location.

**With new innovations like 3D V-NAND, will flash ever overtake traditional hard disk drives in terms of capacity?**

No. In recent times we have seen flash move up a little bit, but when we move into new technologies such as HAMR (Heat-assisted Magnetic Recording) and so forth, and we will

see that areal density of drives will go up. We already announced 10TB drives, when HAMR comes through that 10TB will turn into a 20TB. And two years later that turns into a 40TB.

We are creating so much content that there's not going to be one technology that is going to be dominant. The thing is both of these technologies will coexist because they got different applications. There is no way you can put all the content we are creating on flash, and then the hard drive market falls away completely. There is no way we can put hard drives into mobile phones and tablets. So both technologies are going to coexist. The way things are going, there is going to be plenty of space for both technologies.

**What's WD's strategy for flash then?**

Flash is an important part of our business. We have acquired a few flash companies over the last three or four years. And again, we will be incorporating flash and HDD technology into some of our products to get the best out of both worlds, which is performance and capacity. It depends on the application. It's something that we believe will coexist and we are working to come up with products that will make sense in that space. It's very much about putting the two technologies together and making them coexist. We see a lot of opportunities.



“

**If you make a product easy to use then people are going to adopt and use it. If it's too difficult then it's not going to be well liked.**

”





“

**Image quality  
is not just from  
resolution.**

”

# Breaking away from the trend

YOSHIYUKI NADA  
MANAGER, OVERSEAS SALES AND MARKETING  
DEPARTMENT, MARKETING DIVISION,  
OLYMPUS IMAGING CORP.

by *Marcus Wong*

## Besides resolution, what are consumers searching for in their cameras these days?

There are various customers and requirements are very different for every customer. Still some customers are chasing pixel count. But we think that most customers are satisfied with the current level of resolution, considering their usage. And some are starting to recognize that better lenses gives better resolution; not pixel count. Nowadays cameras have high resolution so it does not make sense that an image has blur from handshake.

Generally speaking, customers require images with no handshake. Especially step-up customers coming from handphones and compacts. They also want quicker response from their cameras – not only from the camera bodies, but also from the autofocus systems on the lenses; a smaller, lighter system overall.

## With that in mind, what is Olympus' main focus when coming up with new cameras?

We will continue to focus on solutions for getting excellent image quality to our customers "any time", "anywhere". This means improving product environmental resistance like water-proofing, shock-proofing and so forth.

Video is getting more important for the industry in general, but still images remain our main focus. This is because to show a movie, you need a high spec PC as editing is a must, but very few customers have the resources to edit video, nor the interest to spend long hours doing so.

## What would you say are the biggest challenges facing the camera industry?

Well as you know, the market size

is shrinking, especially for point-and-shoot cameras. Shipments are down about 30% according to CIPA. Many customers are using their smartphones more for photography, so for digital compact cameras we require something unique and special to stand out. Therefore, we focused on our high-end models, long-range zoom models and also Tough models, which smart phones can't replicate. Some smartphones are supposed to be water resistant, but the truth is that nobody likes to leave their smartphones underwater!

## On that note, do you think other camera companies will follow Kodak's lead and create a camera smartphone?

I don't think so. Camera manufacturers won't launch mobile devices themselves, but there's a possibility they'll provide imaging components, sensors or focus on co-operation with smartphone makers to tie-in some features linking the mobile to our cameras so that they become more convenient to use. For example, send images via smartphone; but capture by camera. The imaging capabilities should stay on the cameras themselves, otherwise, smart phones would have to become bigger, like what cameras are today!

## Competitors are boasting ISO 409,600, but Micro Four Thirds maxes out at ISO 25,600. What's a practical sensitivity limit?

You're right that at the moment the maximum ISO sensitivity is 25,600, but I think it is a reasonable point considering the current technology. But it will be increased because it's not only a sensor issue, but a processor issue also. We can't say how much it will be improved, but it should be

improved in the future.

What most people don't realize is that it is not just the ISO sensitivity of the sensor, but also the processing load from a higher pixel count that creates heat and hence noise, compromising the image quality. If for example, we make an 8-megapixel sensor using today's designs, I'm sure we could get a camera with excellent high ISO capabilities.

But I think it is not a good way to make competition - in specs alone. Even in current level of high ISO, image quality should be improved. That is more important.

## Is there an optimum resolution for a Micro Four Thirds sized sensor?

That's a difficult question to answer. I think it's not good to fix a number because that also depends a lot on the lens performance. At the moment, we would say that 16-megapixels is a good point for us, but all things relate to the technology in use, and that includes lenses both current and future.

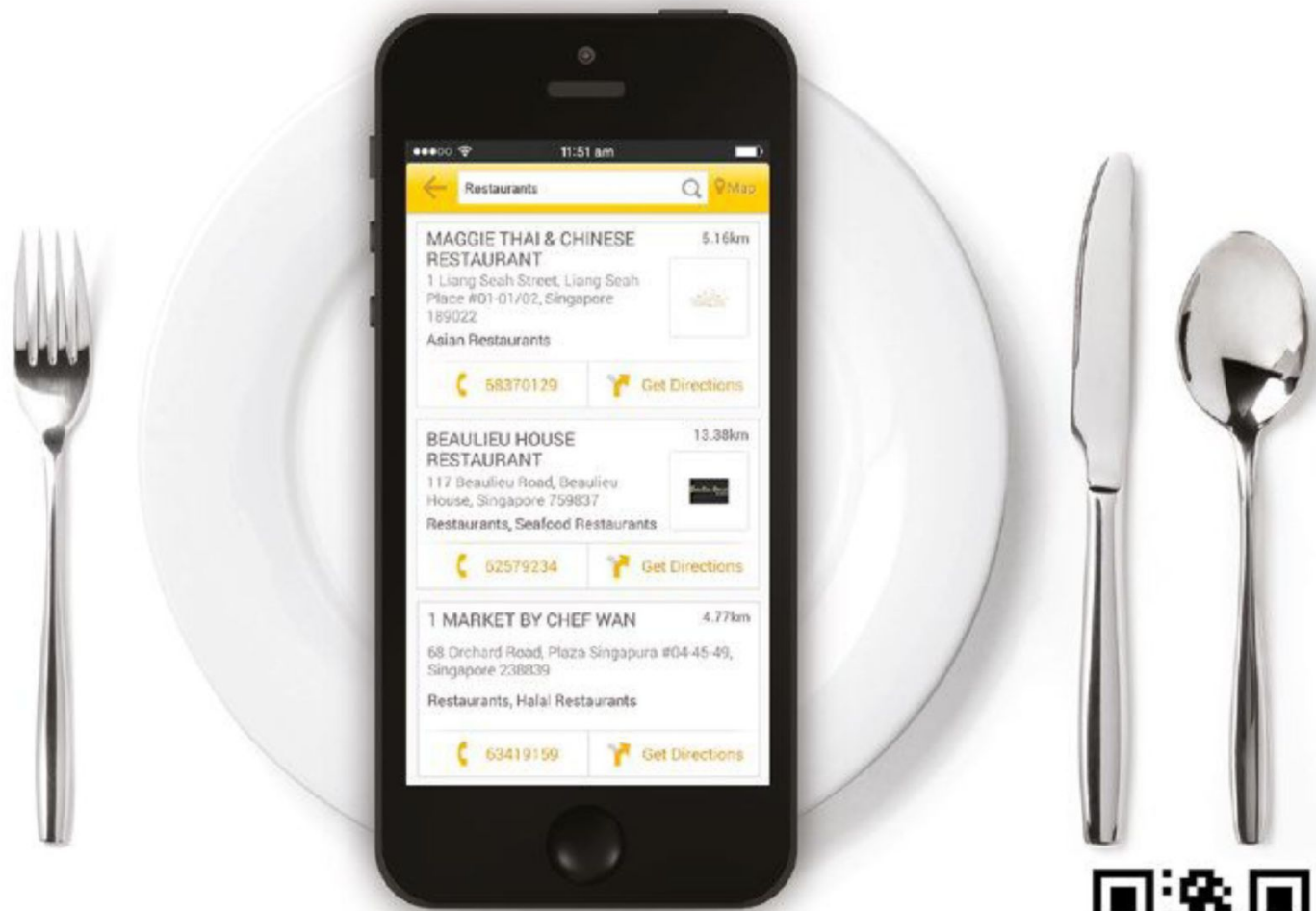
There are lenses that we have designed that should give better resolution, but we can't produce because of the limits of current technology, so such issues still remain. Image quality is not just from resolution; there are many aspects, for example, more dynamic range and better color reproduction.

## Finally, what would your ideal camera be like?

Personally, I think my ideal camera would have less buttons but be more customizable. I'd like it to have quick and accurate autofocus and fast response, and of course the body design should follow the older OM series – they're very beautiful; solid and sharp.



# IT'S NOW EASIER TO FIND A **RESTAURANT** IN TOWN. FIND WHAT YOU NEED IN JUST A FEW TAPS.



Download the free STDIRECTORY app now at [www.STDirectory.sg/App](http://www.STDirectory.sg/App)



STDIRECTORY.SG



STDIRECTORYSG



Available on the  
App Store



GET IT ON  
Google play

A product of SPH, Singapore's trusted media group

## STDIRECTORY on the go.





FEATURE

# TECH THAT DRIVES PHOTOGRAPHY

What's the first thing you ask when you're trying to find out about a new camera? Chances are you'll be trying to find out how many megapixels it has, because that's perhaps the easiest concept to grasp. But is that really the be-all end-all for good images?

Text by *Marcus Wong* Art Direction *Ken Koh*

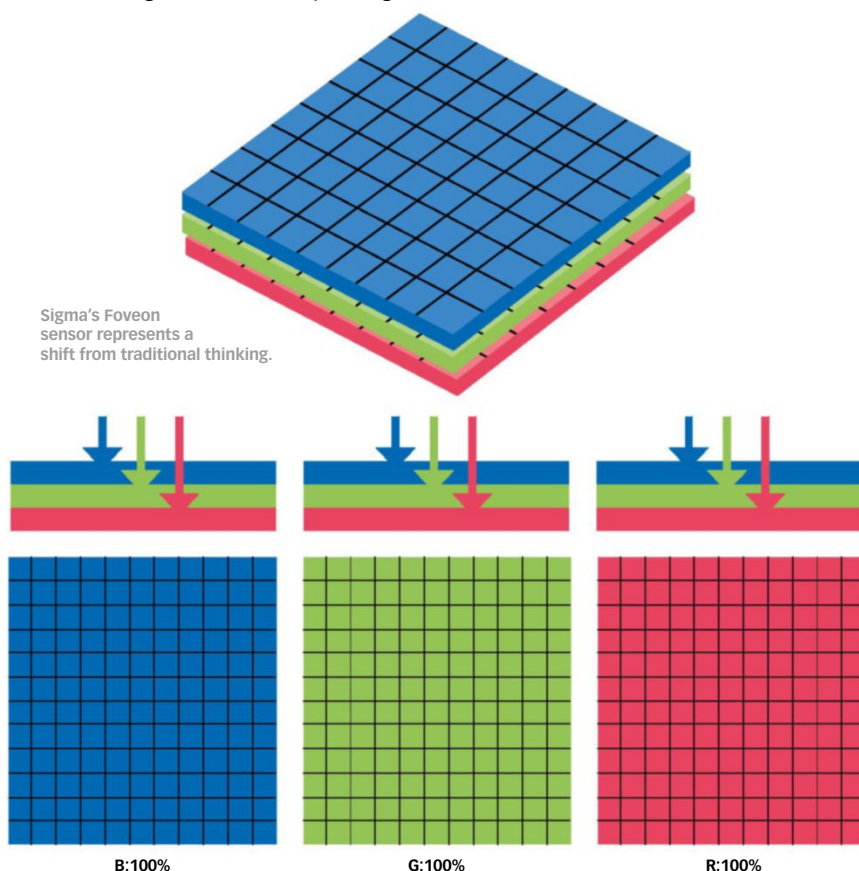
## SENSORS ARE MORE THAN PIXELS

While all of today's imaging sensors are optimized for photon (light) capture, the way they are designed can make a difference between how they deal with noise at higher sensitivities, as well as the way they process details and deal with moiré.

Fujifilm's X-Trans CMOS sensor for example, incorporates an original color filter array with a highly random pattern, which eliminates the need for an optical low-pass filter (OLPF). The X-Trans CMOS's unique color filter array lets the sensor capture unfiltered light from the lens achieving an incredible level of resolution as well as low-light performance.

Meanwhile, Sigma's Foveon sensor rethinks traditional sensor design by having three layers of pixels stacked on top of each other. Instead of having red, green, and blue pixel on the same layer like most imaging sensors, each color gets their own layer allowing it to capture the full color at every point in the captured image. This is akin to how color film used to contain three layers of emulsion which directly recorded red, green and blue light, and essentially works on the same theory – that different colored light penetrate silicon to different depths. The end result according to Foveon is sharper images with less noise.

Sigma's Foveon sensor represents a shift from traditional thinking.



## Processing light

Need to shoot in low light without a tripod? Then the way the camera handles noise at high sensitivities becomes important.

This largely comes down to the way the imaging engine is told to handle the data collected, and the amount of stress placed on the processor. The harder the processor has to work, the more heat generated, which in itself leads to more noise. Most cameras have noise reduction procedures that determine what the noise is on, and then apply the appropriate reduction (generally some form of smudging and blending) to hide the appearance.

Sony for one, uses several technologies together to reduce noise while maintaining image detail. Area-specific noise reduction selectively divides the image into areas based on patterns (such as edges, textures and evenly colored areas like blue skies), then applies the most appropriate noise reduction for each area. At the same time, diffraction reduction technology takes the aperture setting into account to restore clarity to points of light and other fine details, suppressing the effects of diffraction. Finally, detail reproduction technology depicts details more faithfully with a more natural sense of dimension by preventing overemphasized outlines.

## Not just for the pros!

Point-and-shoot cameras have their own innovations too! Just take Casio for example, who came up with a feature to get better images in low light and one to effectively increase the zoom of the camera.

### High Speed Night Shot

Casio's high-speed Night Shot function uses a series of high-speed photographs to create images in the dark. This works by combining

multiple shots to create photos in situations that would take the equivalent of ISO 25,600 sensitivity, pushing the capabilities of the high-sensitivity CMOS sensor so you can take photos in the dark without the use of flash.

### Multi Frame SR Zoom

All images get pixelated when enlarged to a certain extent. This is caused by the blank spaces in between the pixels. Digital zoom

is 'guesswork' on the part of the camera to fill in the blank spaces. Casio's Multi Frame SR zoom uses 'real' pixels instead, taking multiple images of the same scene with each press of the shutter to fill in the blank spaces between the pixels. The number of shots taken depends on the lighting situation, with the image being shifted in all four directions, allowing for plenty of information from which the blank pixels can be filled.



## THE IMPORTANCE OF FOCUS

Photography isn't all about details or sharpness. After all, there's no point having a camera that can give you perfect detail if it takes so long to focus that you can never properly track your subject. If you like taking images with shallow focus for that bokeh effect, then you'll also want to be certain the camera focuses exactly where you want it to, otherwise you might end up with your subject blurred while the thing just behind him is what's actually in perfect focus.

The two main forms of focus in use by cameras today are Phase-detect autofocus and Contrast-detect autofocus.

Phase-detect autofocus is what most traditional DSLR cameras use, with a prism splitting the light coming from opposite sides of the lens and directing it to paired groups of sensor pixels, each forming an AF point. Depending on the focus, the light falling on these points will either line up, or be shifted one way or another relative to each other, thus allowing the sensor to know how much adjustment to make, and in what direction.

One example of the latest in Phase-detect autofocus is Canon's Dual Pixel CMOS AF, which sees about 80% of the sensor filled with pixels that have two separate photodiodes, effectively doubling the number of focus points for comparison. The system also places some phase detect AF points over the center of the Live View area for initial focusing in movie mode before Contrast-detect AF takes over, allowing for faster AF and more accurate tracking. On top of that, are presets that adjust how the focus points react to acceleration/deceleration and the speed at which they switch, thus allowing the camera to better react to different scenarios.

Contrast-detect autofocus on the other hand, uses the difference in light values to determine correct focus - the logic being that an object will have maximum contrast when it is in proper focus. Unlike Phase-detect AF, Contrast-detect AF doesn't give feedback on distance and direction, thus the sensor works by making slight adjustments, checking if the contrast increases or decreases with each shift. This obviously

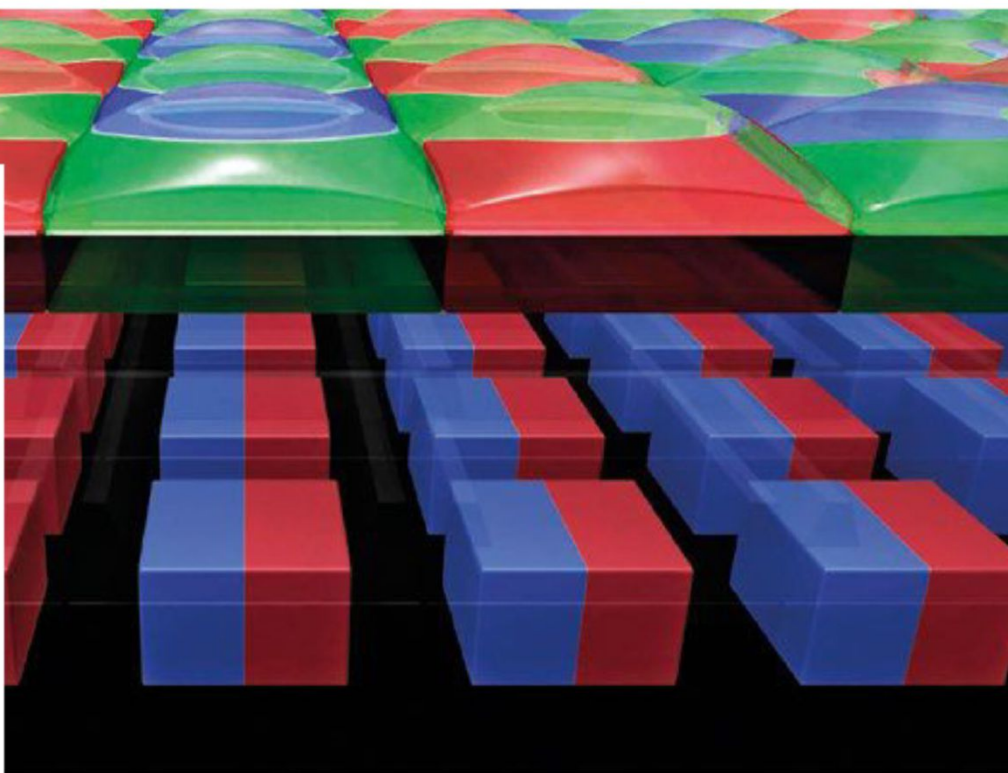
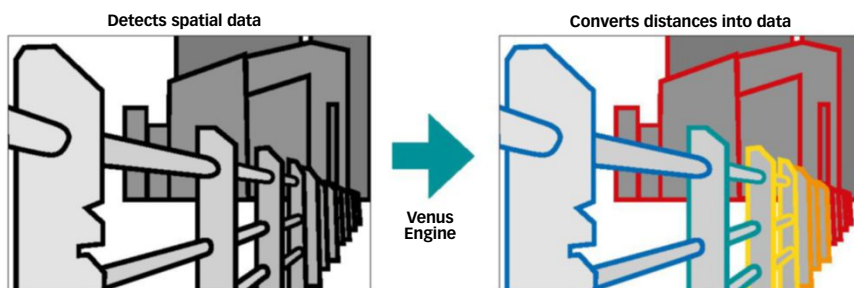


Illustration of Canon's Dual Pixel CMOS AF, where each individual pixel has two separate photodiodes for focusing.

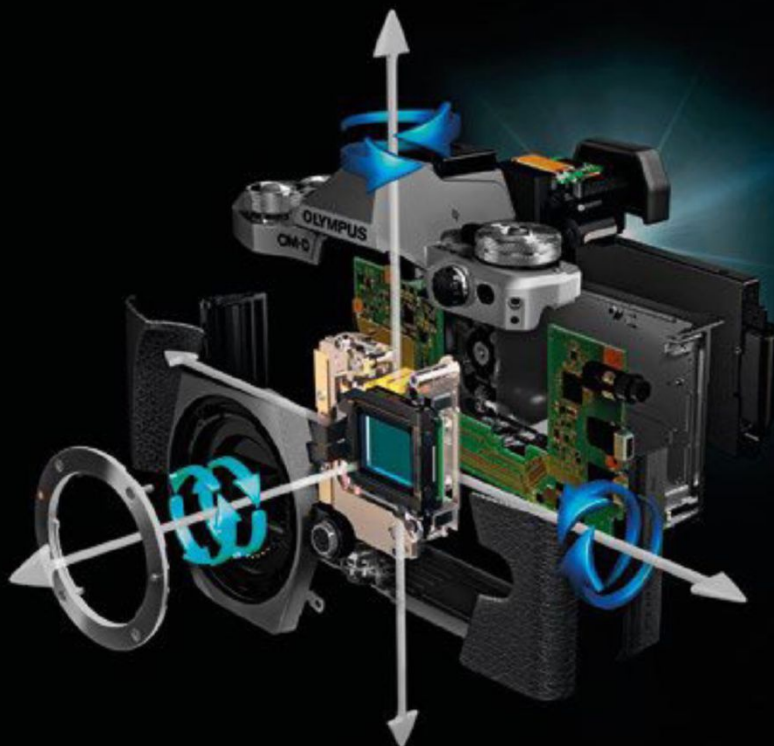
takes longer than Phase-detect autofocus, but has the advantage of not needing an extra sensor for focusing.

Newer Contrast-detect AF systems have caught up in speed though, and Panasonic's Depth From Defocus (DFD) technology is one example of this. Panasonic's engineers realized that not only could they get the change in contrast measurement with each shift of the lens, they could also get the change in signal strength, and so how far out of focus the lens was. Using a database of what essentially is the bokeh effects of all of their own lenses, Panasonic's engineers were able to program their camera to compare just two images by their bokeh "look", and adjust the lens to get close to the final focus setting; with just one or two more normal contrast-autofocus cycles to fine-tune the focus for the final shot.

**THE TWO MAIN FORMS OF FOCUS IN USE BY CAMERAS TODAY ARE PHASE-DETECT AUTOFOCUS AND CONTRAST-DETECT AUTOFOCUS.**



Panasonic's DFD technology calculates the correct distance to the subject by comparing two images with different sharpness levels.



Olympus 5-axis image stabilization accounts for pan, tilt, and roll.

## IMAGE STABILIZATION

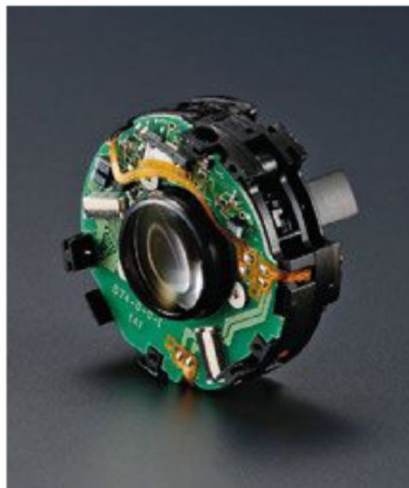
Besides keeping the camera lightweight, image stabilization (IS) is another key feature that camera manufacturers have developed in recent years, and this basically comes in two forms: in-body and lens based.

Nikon has chosen to place its image stabilization system – dubbed VR for Vibration Reduction – in the lens elements, rather than in the sensor. Basically, a selected lens element inside the lens is moved up and down in inverse response to movement detected by accelerometers and gyroscopes, thus compensating for whatever shake the camera (and so the lens) is subject to.

On the other hand, Sony and Olympus have both put their anti-stabilization systems in the camera body itself, and what happens is that a gyro sensor in the body detects both the direct and magnitude of the shake being applied to the camera, passing it over to a processor in the circuit to calculate and apply the appropriate shift to be applied by a moving unit on which the sensor is mounted.

Either way, the net result is that you should be able to shoot between 4 to 5 stops of light darker than what you would normally be able to achieve without, so that's definitely worth consideration.

## IMAGE STABILIZATION BASICALLY COMES IN TWO FORMS: IN-BODY AND LENS BASED.



A Nikon VR Lens unit.

## Cameras gonna shake shake shake?

Both in-body and lens-based stabilization systems have their advantages and disadvantages, so it's important to understand the differences between the two.

For lens-based stabilization, one of the main advantages is that the viewfinder image is stabilized as well, which is especially applicable to DSLRs. Second, as the stabilized element is closer to the center of the optical path, it is easier to obtain an optimal level of compensation than with a sensor-shift system. Nikon feels that sensor-shift image stabilization confines the sensor to a limited range of movement, as it cannot move outside the image circle projected by the lens, which is why they stick to in-lens systems.

The argument for in-body stabilization on the other hand, revolves mainly around the fact that putting the stabilization system in the camera itself allows it to compensate for shake in five axes – including pitch and yaw shake that tend to increase at longer focal lengths, shift shake on the X and Y axes that tends to increase as magnification increases (such as during macro photography), and roll shake on the Z axis that especially occurs during handheld movie shooting and long still-image exposures.

Sony and Olympus are keen to make the point that lens-based stabilization cannot compensate for roll, while cameras with in-body stabilization can always be used with lenses that have lens-based stabilization for the best of both worlds, though that will of course mean more cost.



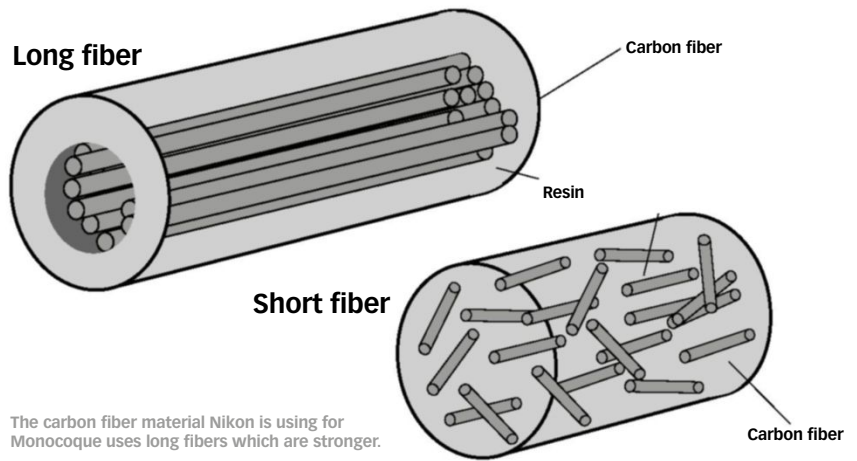
## OF BODY DESIGN AND IMAGE QUALITY

The other factor in getting a sharp image, is being able to keep your camera stable. This is a question of overall mass as well as having a comfortable grip. Weight matters! And this includes the lenses you use, which is probably why compact system cameras have seen such an uptake in recent years.

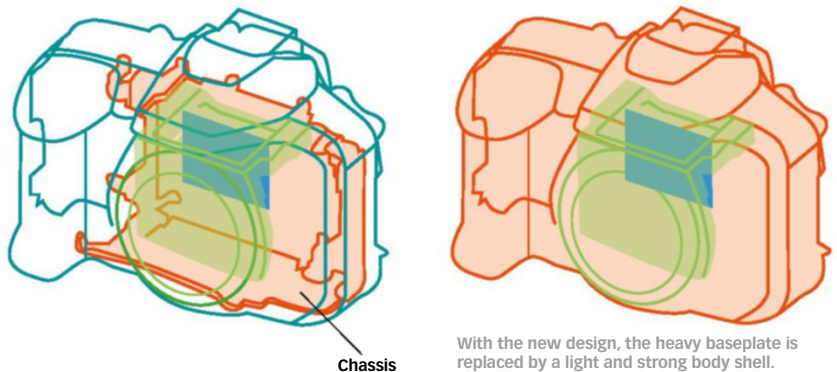
Breaking from the norm, Nikon has taken to using new materials and designs to lighten both their camera bodies and lenses.

The Monocoque design attaches components directly to an outer body shell that employs an advanced material comprising long carbon fibers which resist bending and twisting far better than many materials, allowing for the elimination of the baseplate which would normally support the weight of the camera. This also means a reduction in the thickness of the body while freeing up space for a deeper handgrip on the camera, allowing for better handling overall.

Phase Fresnel technology lightens the overall weight of a lens but removing the parts of lens material which do not directly participate in bending and focusing the light rays, resulting in surfaces with a saw-teeth like shape that are much thinner and lighter than conventional lenses. In the correct configuration, this drastically reduces the size and weight of the lens, while preserving optical performance.



### Monocoque body design



## THE BEAUTY OF TOUCH

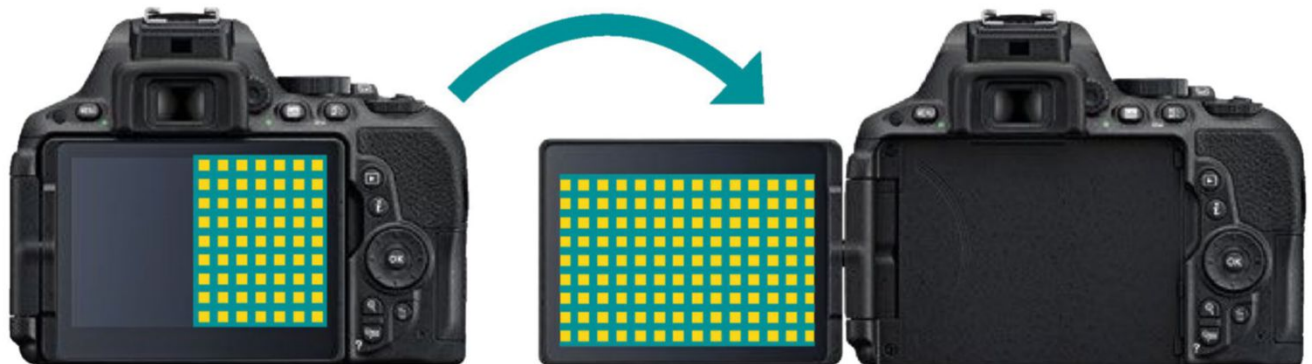
Touchscreen capabilities are also something that have started to become quite common, and while the main advantage may seem to be ease of use in browsing through menus, the other thing is the sheer accuracy of using touch to focus. Instead of struggling to shift to the nearest autofocus point, touch focus allows you to tap the spot directly.

Olympus has a Super Spot AF function, which focuses on a small area in the center of the image and enlarges it another 70 times, allowing you to select your focus point with extreme precision.

In an example of thinking out of the box, Nikon's new D5500 incorporates a new Touch Fn system, which keeps the touch sensitive layer of the screen enabled while

your eye is at the viewfinder so you can still use your right thumb or fingers to control certain functions by swiping. Focus points can also be selected by swiping with your thumb, in addition to other features such as ISO, aperture adjustment and more, so that also makes selecting the appropriate focus point faster and easier.

HMM



Depending on usage scenario, Nikon's Touch Fn (area denoted in green) stay touch sensitive even when the display is off.



**25** YEARS  
**OF TORQUE**

**\$25 SUBSCRIPTION  
DEAL**

**SPECIALLY FOR OUR  
25<sup>th</sup> BIRTHDAY!**

For just \$25 (U.P. \$82.80), you get a year's digital subscription of Singapore's best homegrown car magazine, *Torque*! Be the first to read our latest stories and your favourite car reviews, not forgetting our digital edition exclusive content!

Offer valid till April 30, 2015.

**SAVE  
70%**



**SCAN TO  
SUBSCRIBE**



OR LOG ON TO  
[WWW.TORQUE.COM.SG/  
PROMOTIONS](http://WWW.TORQUE.COM.SG/PROMOTIONS)





FEATURE

# GETTING THINGS DONE WITH TECHNOLOGY

Get things done with technology at your side — here's how to upgrade your productivity with the latest office gear and apps from 2015.

Text by *Team HWM* Art Direction *Ken Koh*

# THE BEST WINDOWS 8.1 APPS FOR PORTABLE PRODUCTIVITY

Thanks to slim and light multi form factor Windows 8.1 devices like ASUS' 2-in-1 Transformer Book Chi and Zenbook Ultrabook series, it's never been easier to set up office and start working, no matter where you are. But for maximum productivity you need the right tools for the job. Here's our picks for the best Windows 8.1 apps for portable productivity.



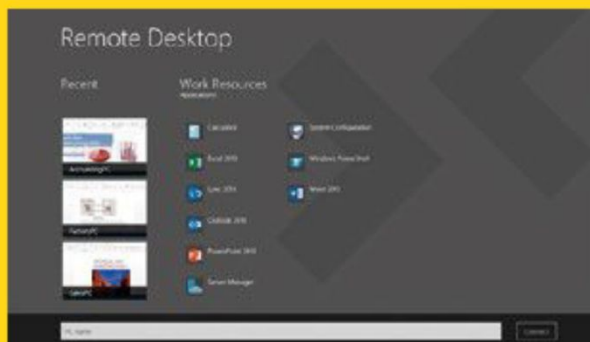
## Windows 8.1 Remote Desktop

Free

An essential app for anyone that's frequently away from their home or office PC, Windows 8.1

Remote Desktop lets you remote access your home or work computer from anywhere you have an Internet connection. All you have to do beforehand is set up Remote Access on your home computer, and leave it running with a stable Internet connection.

The app is ideal for accessing a file or spreadsheet you don't have on hand, or for multitasking across different computers simultaneously - you can even copy and paste files between different desktops!

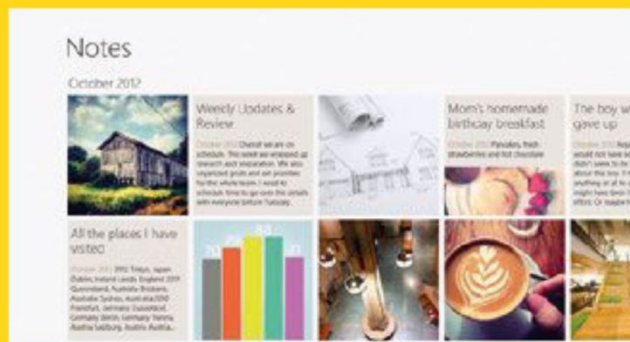
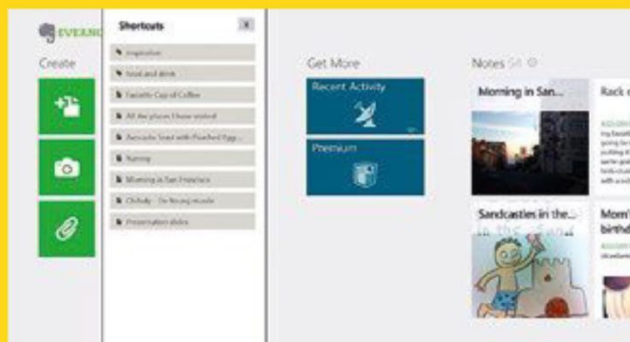


## Evernote

Free

Evernote is a free organization app that works across all of your connected devices, from your home or work computer, to your laptop, tablet and smartphone, no matter what OS you're running. The app stores everything you could possibly imagine losing track of, like a to do list, a receipt, an article you want to read, a photo, or even a voice recording, syncing all information between each of your devices. Type up an email draft on your laptop while you're on the way to the office, and it'll be waiting for you when you get to your desk. All notes are searchable and can be relocated later if needed.

While the basic app is free, an upgrade to a premium US\$5/month subscription enables a higher monthly upload limit, faster word recognition in images, heightened security, and the ability to search text within PDF documents.





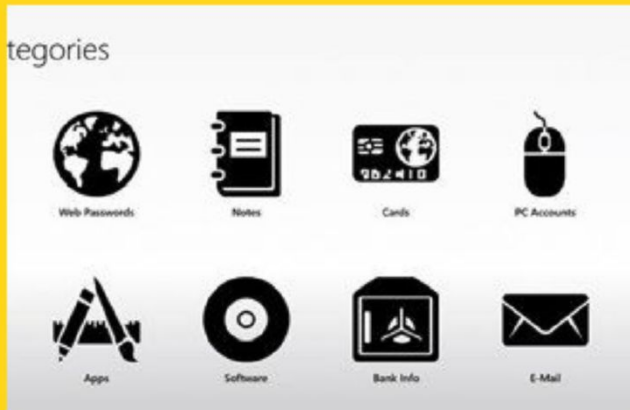


## LockIt

Free

Sometimes it's hard to remember all of your passwords, especially if your company has a password expiration policy. Rather than writing your current

password down somewhere, you can use RNG Lab's LockIt app. The app provides a secure location for users to store passwords, credit card data, bank account information, software keys and more. The app uses military-grade AES encryption to protect your data, so you know it's secure, plus it automatically synchronizes data across all Windows 8.1 systems and allows users to import their data from other password manager programs.



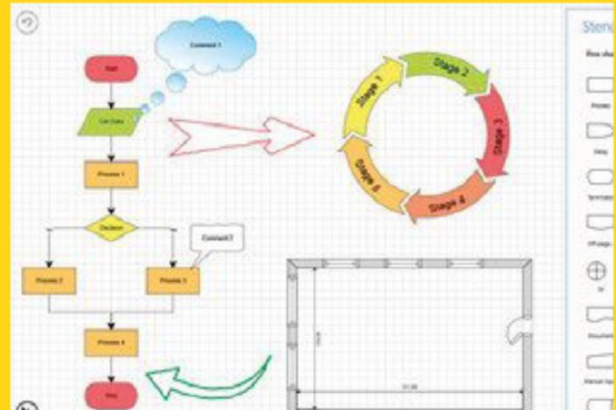
## Grapholite Diagrams

\$53.49

While \$53.49 may seem like a lot to spend on an app, Grapholite Diagrams is definitely worth it. Making flowcharts, technical drawings and all other

types of business charts and graphics can be tricky enough on your home PC, let alone your laptop or tablet, but Grapholite makes everything easy thanks to its freehand drawing recognition that lets you use your finger and touchscreen to put together anything from simple sketches all the way up to complicated technical diagrams.

The app also makes sharing, printing, and exporting your diagrams a breeze thanks to a simple-to-use one-click interface.

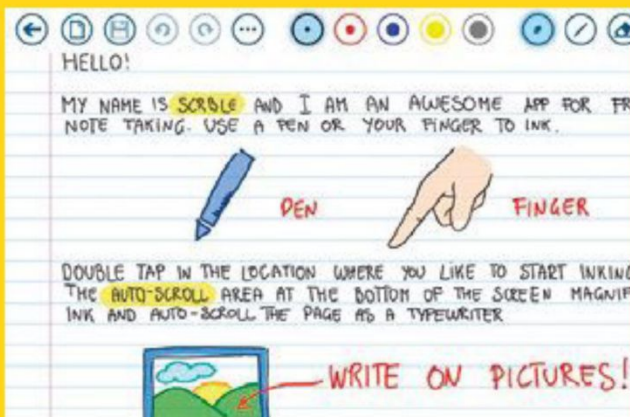


## Scribble

\$5.99

Typing out notes in the middle of a meeting can be a chore. Scribble turns your touchscreen tablet or laptop into a digital notepad, letting you quickly jot things

down in your own handwriting with a digital stylus or even your fingertip. Extra features include a smart highlighter functionality and the ability to take or import a picture, and then annotate it (great for taking a quick snap of the white board notes and then adding your own comments).



## WorldMate

Free

WorldMate is an essential app for anyone who takes frequent business trips. Like many other travel apps, WorldMate can be used to organize your trip,

letting you see all of your itineraries and reservations in one place, and add other destinations, appointments, meetings, and events that you need to attend when you're out and about. What makes WorldMate special is its enterprise-friendly service integrations, such as its LinkedIn connectivity, which alerts you when a member of your LinkedIn network is on the same trip as you.



# Mobile Offices

*You no longer need to be chained to your desk to get work done. These slim and light Windows 8.1 PCs will give you the freedom to set up office wherever you are.*

## ASUS TRANSFORMER BOOK T90 AND T100 CHI

For ultimate portability and versatility, the new Transformer Book T90 (8.9-inch) and T100 (10.1-inch) Chi are hard to beat. The T90 Chi sports an 8.9-inch 1200 x 800 pixel resolution touchscreen display and is powered by a quad-core Intel Atom Z3775 1.46GHz processor. The ultra mobile PC can be separated from its lightweight slim keyboard and turned into a full Windows 8.1 tablet. If you're after something a little bigger, the T100 Chi boasts a 10.1-inch Full HD 1920 x 1080 pixel resolution touchscreen display. If you're having a hard time choosing between the two, opt for the T90 Chi if you think you'll spend more time using the tablet mode, and go for the T100 Chi if you'll use the laptop mode more. Both devices are also ultra-quiet thanks to a fanless design, so you don't need to worry about disturbing people around you!

**SRP: To be announced at a later date.**

## ASUS TRANSFORMER BOOK T300 CHI

If you're after something a little more powerful, consider the ASUS Transformer Book T300 Chi, which is powered by Intel's brand new Intel Core M-5Y71 processor. This 12.5-inch machine boasts a stunning WQHD 2560 x 1440 pixel resolution display. Like the T90 and T100 Chi, it sports a fanless design that lets it run virtually silent, and it can be separated from its keyboard, turning it into a full Windows 8.1 tablet. Despite having a larger and potentially higher resolution display, the T300 Chi is actually lighter and thinner than Microsoft's Surface Pro 3, measuring a razor thin 7.6mm and weighing just 720g in tablet mode. Even with the keyboard attached, the T300 Chi is one of the slimmest laptops out there, measuring a mere 16.5mm, making it thinner than a MacBook Air.

**SRP: Retailing at \$51,498 from March**





### ASUS ZENBOOK UX305

If you prefer a more traditional notebook form factor the Zenbook UX305 is one of the sleekest 13.3-inch Ultrabooks available, measuring just 12.3mm thick and weighing a mere 1.2kg. Powered by an Intel fifth-generation Core M processor with a whopping 4GB of RAM, the fanless design lets it run almost completely silently. The Zenbook UX305 also boasts a 1920 x 1080 Full HD display. Under the hood, you'll also find a speedy 128GB SSD. Top level sound has not been left out of the ZenBook UX305's repertoire, which incorporates ICEpower, Bang & Olufsen technology to bring booming bass and crystal-clear vocals.

**SRP: Retailing at \$5999 at all ASUS authorised stores now.**



### ASUSPRO BU201

Built to withstand the rigors of frequent business travel, the ASUSPRO BU201 Ultrabook is an ultra-light and durable enterprise Ultrabook sporting a tough carbon fiber reinforced lid. The carbon fiber construction gives better protection than most Ultrabooks, while remaining light, with the entire Ultrabook weighing just 1.35kg. The notebook is subject to US military-standard quality testing, which includes enhanced drop testing at more than double the height and extra-strict hinge testing. To ensure the integrity of your data, the hard drive is also equipped with anti-shock technology.

Inside, the BU201 is a very capable machine, armed with a Full HD 12.5-inch display, and a 4th generation Intel Core i5 or i7 processor with 4GB RAM. You'll also find three USB 3.0 ports, a 4-in-1 card reader, an onboard RJ-45 ethernet port, a VGA port for connecting to projectors or displays and a Mini DisplayPort port.

The ASUSPRO BU201 is also available with LTE.

**SRP: From \$51,698 onwards. Contact ASUS for more information on enterprise pricing at 6622 8872.**



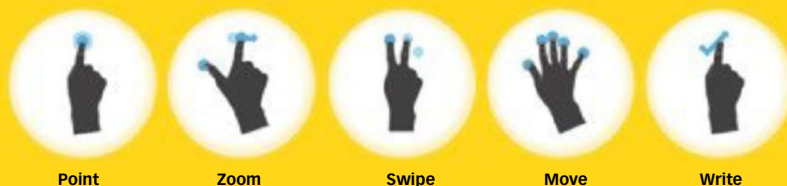


# 7 TIPS FOR THAT IMPRESSIVE PRESENTATION

Bet you didn't know that projectors aren't just for projecting images anymore – you can use them for more engaging and impactful presentations.

## Control with Your Fingers

With the Epson EB-595Wi, EB-1430Wi, and Windows 7/8, you can easily control your presentations using only your fingers. You can scroll, press and tap, pinch in/out and rotate images using only your fingers, and any images or writing on the screen can be resized as if they were real objects. Simply use the interactive pens for writing, and let your fingers do the rest. Using Epson's on-screen projector operation, you can easily control your projector right from the screen itself. Power on/off your projector, change the source, adjust the volume or mute it, simply by clicking the controls on the screen.



Point

Zoom

Swipe

Move

Write

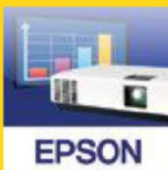
## Use an Interactive Pen

Transform the projector's flat image into a large interactive screen with an interactive pen. The pen's accuracy and quick response makes it seem like you're writing right on the screen, and you can freely annotate on the projected content. When you connect the projector to a PC via USB or over the network, you can also use the pen like a mouse to easily select and control your PC, so you can make your presentation and make changes without hovering over your laptop.



## Project from Your Smart Devices

Leave the laptop at home and project from a smart device using the Epson iProjection app for both iOS and Android. The app supports various files and lets you project with ease, it even lets you use familiar touch-screen gestures, like flicking to turn pages and pinching to zoom in and out of presentations.



## What's an Ultra Short-throw Projector?

**Short-throw projectors let you project big images in tight spaces, for example you can project an 80" screen from just 33" away with the Epson EB-536Wi. Ultra-short projectors can project large images at even closer distances, like a 100" image from as little as 12" away, but they must be mounted.**

**Because of this unique feature, they can be mounted closer to walls or used in window displays. They can even be mounted right onto tabletops, where they can project interactive surfaces for use with Epson's interactive pens and finger-touch interactivity.**

**Besides the ability to save space, another benefit of ultra short-throw projectors is that because they're so close to the screen, presenters usually stand outside of the projector's beam of light, significantly reducing glare on the presenter and shadows cast on the screen.**



Left: A conventional projector can project light into the presenter's eyes and cast a shadow on the screen.

Right: Because an ultra short-throw projector is mounted close to the display surface, the presenter is out of the light's way, and doesn't get glare or cast a shadow.

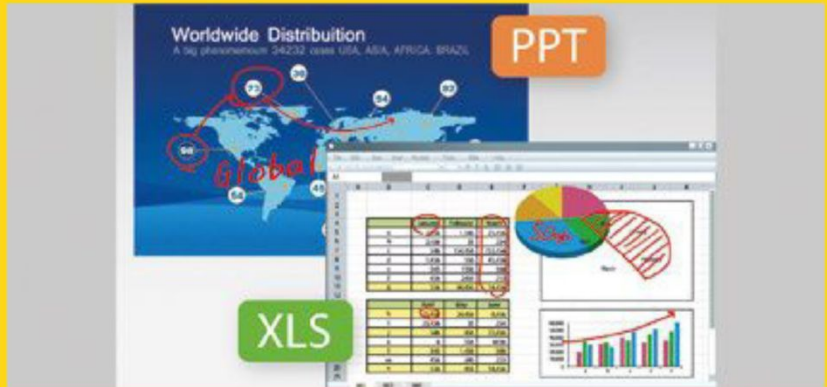
## Write on the Screen even without a PC

This original Epson feature lets you annotate right on the screen, even without a PC connected to the projector. Using your fingers, you can write on the screen just like you would on a whiteboard, and the PC-free interactive mode lets two people write at the same time for greater interactivity and teamwork.



## Edit Office Documents on the Screen

When you link compatible projectors to a PC, the Microsoft Office Ink function lets you handwrite comments and diagrams with your fingers or an interactive pen, directly onto the projected Powerpoint, Excel and Word documents, and even save your changes. No longer do you have to take notes and edit your documents later, you can mark them up immediately on the projected screen.



## Share a Whiteboard

Not only can you project a presentation from your projector, you can also share the presentation with others using the whiteboard mode. Simply use a URL link that can be accessed from their PC or smart devices in the browser, with no additional software needed. The whiteboard mode share function also lets you annotate, insert images and save content from any device, increasing participation and productivity. You can even save the changes on the device itself. Up to 15 devices can be connected at a time.



## Use an Ultra Short-Throw Projector Anywhere

With the ability to project large interactive images at short distances, Epson's ultra-short throw projectors can be mounted onto tabletops to transform the table into an interactive surface, or used for multimedia projection in retail window displays. With its versatile performance, the possibilities are endless.





# Share the Image

*Epson's short and ultra-short throw projectors let you share big images in small spaces.*

## EPSON EB-536Wi

The Epson EB-536Wi lets you project large screen sizes even at close range and makes your presentations larger-than-life. With its versatile projection modes and flexible positioning, you can easily deliver vivid presentations with flexibility even within limited spaces.

Annotate on projected content with the interactive pen and write on the projector screen like a whiteboard, even without a PC input source. The EB-536Wi is easy to set up, with a one-time Auto Calibration and Auto Resolution Adjustment, with no drivers required (except for Macs) so you can get started right away.



Short-throw distance with large display



## EPSON EB-595Wi/585Wi/575Wi

With their ability to project large images in short distances, the Epson EB-595Wi/585Wi/575Wi ultra short-throw projectors transform any surface into an interactive screen, with PC-free annotation and finger-touch interactive functions for the EB-595Wi.

PC-free annotation lets you work right on the projected image, as if it was a whiteboard, without the need for a PC. It's great for brainstorming sessions and presentations. With the EB-595Wi's finger-touch interactivity, you can scroll, press and tap, pinch in/out and rotate images using your fingers, and you can also have two people writing simultaneously, with two fingers and two pens operating at the same time for greater interactivity.



Two interactive pens and finger-touch



Adjusting images using fingers





## EPSON EB-1420Wi/1430Wi

The Epson EB-1420Wi/1430Wi business projectors bring the world to your fingertips, with the ability to connect up to four parties from different countries and finger-touch interactivity on the EB-1430Wi.

These ultra short-throw projectors are bolstered by the ability to print wirelessly, and a whiteboard mode that allows users to share content from the projector's screen to PC or smart devices via the browser. There is no additional software needed. The ultra-short projectors offer equally high white and color brightness of 3,300 lumens, so you get bright images that are also rich in color.

Using the revolutionary finger-touch interactivity technology on the EB-1430Wi, you can scroll, press and tap, pinch in/out and rotate images using only your fingers, even with wireless projection. Anyone can use their fingers to conveniently draw and annotate on projected elements, turning a static meeting into a collaborative session. And when you connect the projector to compatible Epson printers, you can simply hit 'print' on the screen.



Erase contents easily using fingers



## What is Color Brightness?

Projectors have always had their brightness levels rated, but only for white light. However, there's a drawback to that, as they may have very different brightness levels at different colors.

The Color Brightness specification is a new international standard that measures a projector's color light output in lumens. It provides a way for customers to more completely compare image quality between projectors, as projectors with high white brightness can have Color Brightness levels as low as 1/3 of its white brightness specification.

A projector with high Color Brightness levels has been rated for vibrant, realistic colors, but a projector with low Color Brightness levels can look dull and lackluster, even though the overall image is bright.

In comparison with single-chip projectors that filter a single white beam of light through a color wheel, 3LCD projectors project brighter and more accurate colors as they produce equal white and color brightness, with more details, smoother graduations and no 'color breakup' effect.



Epson

COLOR BRIGHTNESS: 2600 LUMENS

WHITE BRIGHTNESS: 2600 LUMENS



Single-chip Projector

COLOR BRIGHTNESS: 750 LUMENS

WHITE BRIGHTNESS: 2700 LUMENS

\*Compared against similarly priced leading 1-chip DLP® business and education projectors based on NPD data from July 2011 through June 2012 (available from [www.npd.com](http://www.npd.com)). Color brightness (color light output) measured in accordance with IDMS 15.4. Actual color brightness will vary depending on actual usage conditions. 3LCD® is a registered trademark of Seiko Epson Corporation. DLP® is a registered trademark of Texas Instruments, Inc. and its use here does not imply any affiliation with or endorsement by them.

# BUSINESS-CLASS PROTECTION

In this digital day and age, work isn't just about pens, paper and stacks of files. Instead, entrepreneurs and business owners have moved to laptops, desktop computers, printers, servers and even the cloud to help run the businesses of today and those of tomorrow. And if electronics are your key tools of the trade, using a simple power strip might just be enough to protect your equipment from power surges, but you're still out of luck when the power goes out and your mission-critical systems taken offline. Here's a quick and dirty guide on how to go about getting the right battery backup systems for your needs.



## Why should I get a UPS system?

Almost all national grid supply systems are subject to interference from natural and industrial sources, and no electrical supply source is free from brown-outs, interference and voltage variations. Business interruptions can cost a lot of money, whether directly or in the form of opportunity cost. Unexpectedly losing power could mean that unsaved business proposal disappearing, wasting a good day or two of preparation and research. Power surges and unstable voltages can disrupt and damage mission-critical hardware, leaving you both out of pocket in terms of replacement costs, as well as business downtime. UPS systems help businesses respond to a power outage by supporting equipment until backup generators can be put online, or simply to let you properly save working documents and shut down key systems safely.



## UPS Systems: Line Interactive vs Online

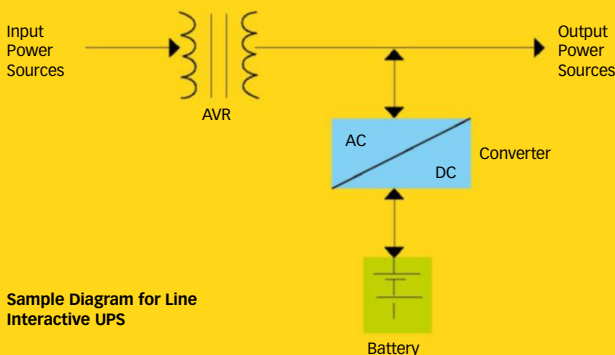
### Line Interactive

Now the most common type of UPS offered on the market, line interactive UPS models come with Automatic Voltage Regulation (AVR) technology. In addition to doing everything that the traditional old Standby UPS does, this type of UPS also monitors the level and quality of the power coming from the wall and does some power "cleaning" by regulating the voltage flow. A line interactive UPS system provides protection against spikes and switching transients, as well as adequate protection as long as power sags do not occur continuously.

When a blackout occurs, the UPS uses a voltage-sensing transfer switch to draw power from the batteries, and provides a power backup of around 10-45 minutes depending on the load. The use of the switch, however, results in an inevitable transfer time of 2-8 ms.

The more advanced line interactive models with USB connectivity come with software that can help shutdown connected equipment when mains power failure occurs. In addition, this software can be used to monitor and log system information such as voltage, power supply, current draw and alarm history.

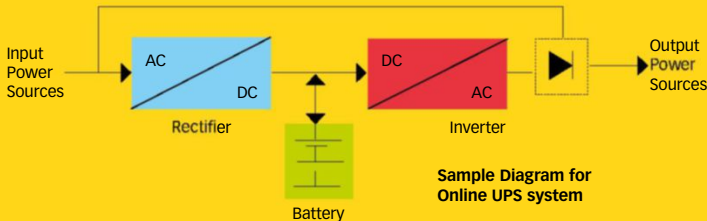
Line interactive UPS systems are excellent value for money for home or small office use due to affordable prices and reasonable back up times. However, they are suitable for applications where a fast transfer time is necessary since data can be lost if the UPS cannot transfer to battery backup in time.



## Online

Online UPS models however, are designed with totally different use cases in mind. An Online UPS is actually designed to totally isolate the device(s) attached to it from mains power, using a technique called double conversion, constantly filtering mains power through the battery system. Unlike Line Interactive UPS models which switch to battery power when an outage occurs (thereby involving a very brief delay when switching), the attached electronics of an Online UPS run completely from the battery, which is in turn constantly topped up by mains power. This means that an Online UPS is never interrupted by external power loss or issues with voltage regulation.

Online UPS are the preferred choices for servers and IT storage equipments, remote mobile telecommunications, medical applications, water treatment plants, scientific labs and even military applications. It generally provides higher power density as compared to Line Interactive UPS. PROLiNK UPS models are available in rackmount or tower units from 1kVA to 210kVA options, with a full range of accessories to support your needs.



## How Much Power Do I Really Need?

Depending on what (as well the number of) devices you're planning to connect to your UPS, figuring out just how much power you really need from a UPS can be made easier by referencing the chart below.

No. of Computers	Online UPS - Professional Series			
	1kVA	2kVA	3kVA	4kVA
1 PC	50 mins	2 hrs	2 hrs 55 mins	4 hrs 30 mins
2 PC	25 mins	45 mins	1 hrs 30 mins	2 hrs 30 mins
3 PC	14 mins	30 mins	50 mins	1hr 30 mins
4 PC	9 mins	20 mins	35 mins	50 mins
5 PC	7 mins	15 mins	28 mins	40 mins
6 PC		12 mins	23 mins	30 mins
7 PC		10 mins	19 mins	25 mins
8 PC		9 mins	15 mins	23 mins
9 PC		8 mins	14 mins	21 mins
10 PC			12 mins	18 mins
11 PC			11 mins	15 mins
12 PC			9 mins	13 mins
13 PC			8 mins	12 mins
14 PC			7 mins	11 mins
15 PC				10 mins
16 PC				9 mins

The backup timings stated are for generic reference only, and the actual backup timing is dependent on the power consumption of the PCs (CPU, monitor, other equipment) that are connected up to the UPS.

For advice on your requirements, you can contact PROLiNK directly. Customers can either email [sales@fida.com](mailto:sales@fida.com) or call us during office hours at 6357-0668.

## UPS Terms Cheat Sheet

**Here's a handy guide to some terms used to describe UPS systems.**

### Current (A)

**The 'volume' of electricity flowing in a circuit and expressed as Amps (Amperes).**

### Direct Current (dc)

**Where the electrons of the current are only flowing in one direction.**

### Distortion

**A variation in a waveform from a true wave shape**

### Phase

**A single-phase supply consists of a single sinewave at the fundamental frequency. A three-phase supply consists of three waveforms each separated by 120° from each other. Phase is also used to refer to the difference between the voltage and current waveforms when used in relation to power factors.**

### Power Conditioner

**A device to stabilise, regulate and filter the mains power supply voltage.**

### Power Factor (pF)

**The difference between the actual energy consumed (Watts) and the Volts x Amps in a circuit. Power factor may be lagging, where the current waveform lags the voltage waveform, or leading where the current waveform leads the voltage.**

### Overvoltages

**Any higher voltage than that agreed as a regulated voltage in a circuit.**

### Undervoltages

**A voltage below the set regulated voltage for an extended period.**

### Hertz (Hz)

**A measurement of the number of complete cycles per second of a waveform. Normal mains frequency is either 50 or 60 Hz.**



# Empowering Business Continuity with Always-On Power

*PROLiNK's Uninterruptible Power Supply product lineup helps you and your employees work with confidence and peace of mind.*

## PRO SFC SERIES PRO700SFCU / PRO850SFCU / PRO1200SFCU

The PROLiNK PRO SFC Series features a more basic and straightforward feature set (as compared to the PRO SFT Series), as the former features a set of three status indicator LED lights on the front fascia. This lets users quickly see if the UPS is operating properly, or if there are any issues that need attention. Managing the PROLiNK PRO SFC Series can easily be done over USB (specifically for the SFCU series only), with support provided for Windows, Linux and Mac operating systems. PROLiNK also provides three different battery capacities for users to choose from; 650VA (PRO700SFCU), 850VA (PRO850SFCU) and 1200VA (PRO1200SFCU).



## PRO SFT SERIES PRO700SFTU / PRO850SFTU / PRO1200SFTU

Some useful features on the PROLiNK PRO SFT Series include a LCD user interface, which provides key bits of information at a glance, such as output voltage, input voltage, load level, battery level and even overload warning signals. Of course, you can also manage the PROLiNK PRO SFT Series over USB or RS-232 (also known as serial) connections, with support provided for Windows, Linux and Mac operating systems. Depending on your power requirements, PROLiNK provides three different battery capacities for users to choose from; 650VA (PRO700SFTU), 850VA (PRO850SFTU) and at the top end, 1200VA (PRO1200SFTU).



## MASTER SERIES (1P/1P) 2-IN-1 RACK/TOWER

Designed to be installed either within a rack-mount, or in a standing tower configuration, the Master Series is a single-phase UPS system with a true online double-conversion technology. The 6kVA (PRO806RS) and 10kVA (PRO810RS) models comes with parallel redundant systems that allow three UPS models to operate in parallel, thereby acting as backup for each other. The LCD display also auto-rotates that caters to installation preference, whether vertical or horizontal.



### MASTER SERIES (3P/1P) TOWER

Featuring three-phase input / single-phase output capabilities, mid-sized business servers, industrial systems and equipment are protected by the PRO83110S having a wide range of voltage inputs to easily handle voltage fluctuations. An internal bypass system also enables continuous power even when undergoing maintenance. You can also add on an isolation transformer to suit your business' unique requirements.



### MASTER SERIES (3P/3P) TOWER

This tower of power comes stacked with a bevy of features to protect mission critical applications including small server rooms, medical devices, telecommunication facilities and industrial processes, foremost of which is three-phase input and three-phase output. Other key features include an emergency power-off function connector, maintenance bypass switch, Input Power Factor Correction value of 0.99, multiple communications interfaces (USB, RS232), and more.



### PROFESSIONAL SERIES (1P/1P)

The Professional Series (1P/1P) range presents PROLiNK's more affordable range of UPS equipment for businesses, while yet retaining a good mix of features. These towers come in varying capacities from 1kVA to 6kVA, and cover a wide voltage range between 110 and 300VAC. A handy LCD user interface lets administrators inspect the UPS at a glance. Communicating with the device is done via USB, RS-232, AS400 or SNMP via the intelligent slot feature.



### POWER SERIES (3P/3P)

The Power Series (3P/3P) true online double conversion UPS system can easily adapt to all kinds of diverse and complicated loads to protect vital facilities like data centers, medical equipment and call centers. The Power Series helps to lower installation costs by using smaller cables and miniature circuit breakers, and is easily maintained via a front-access chassis. The Power Series comes with a parallel redundant system that allows four UPS models to run in parallel, and is available in models ranging from 15kVA to 120kVA.



# YOU CAN PRINT FROM YOUR MOBILE PHONE

It's 2015 – we don't just work from our laptops and desktops, but also from our mobile phones and tablets. What most people don't know is that you can print straight from your mobile devices – and in some cases, it's even easier to set up than with a PC.

Compared to when we used to need drivers, cables, shared networks and hosts to print at work from a connected PC, mobile printing lets you print from mobile devices without drivers, wirelessly, with the ability to print through the cloud, discover printers contextually, and print anytime, anywhere.

## How to Print Wirelessly

With HP wireless direct, you can simply connect your mobile device to a printer or Multi-function Printer (MFP), the way you'd discover and connect to public Wi-Fi.

1. Simply look for the HP printer in your mobile device's Wi-Fi settings and connect – no drivers needed.
2. Once your mobile device has connected, hit the built-in Print command (available for most Apple, Android and Windows devices). It's as simple as that.



## How to Print Using Touch-to-print

With NFC-enabled smartphones or tablets, you can simply touch NFC-enabled HP printers to connect and print from your mobile device.



*Will Other People Be Able to Print from My Printer?*

**A common question people have is if it's so easy to connect to and print from a HP wireless printer, can unauthorized users connect and print without permission? The good news is that while you can set up the HP wireless printer to connect directly without passwords, you can also set up a password so only people you allow can print.**

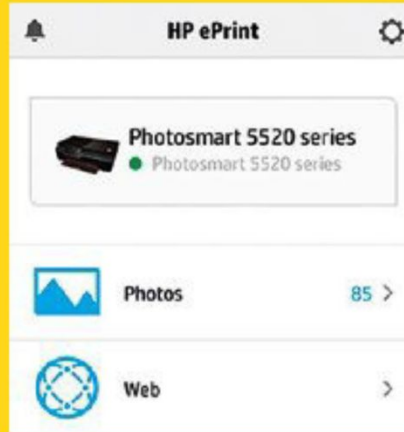
**Company administrator can even allow employees to print through firewalls, as well as allow guests to connect directly to a HP printer without accessing the company network. It's all about helping you print wherever you want, whenever you want, as safely as you want.**



## How to Print Using the HP ePrint app

In some cases, with mobile devices without built-in print support, you can download the HP ePrint app and connect using the app.

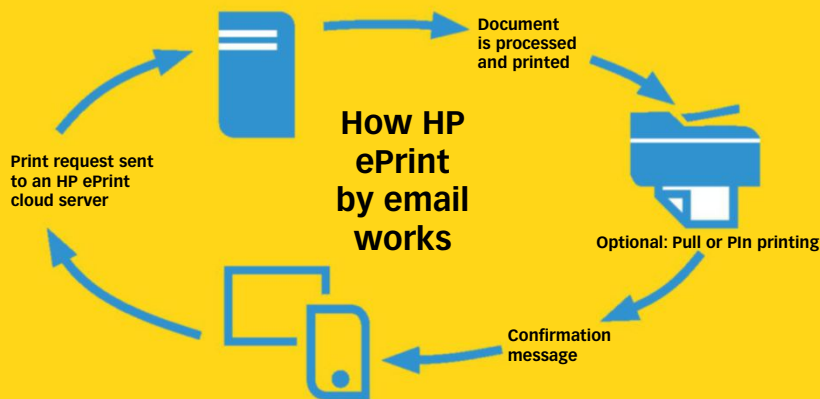
1. Using the app, connect to the HP printer wirelessly, just as if you're connecting to public Wi-Fi.
2. Once your mobile device has connected, you can just hit print from within the app.



## How to Print Using Email

With HP ePrint by email, you don't even need to be anywhere near the printer in order to print. All you need is email. This is super handy if you need to print documents for others, or even as an alternative way for friends, family and colleagues to connect to your printer.

1. Sign up for an account with HP's ePrintCenter and add your printer to your account. You'll be given your printer's existing pre-assigned email address.
2. You'll notice that it's a pretty long 12-character email address, but you can customize this address to one that's easier to remember. Just click 'change' and save your custom email address.
3. Once you've confirmed your printer's email address, simply attach any documents you want to print and email it to your printer. As long as your printer is powered on and connected online, it'll print!



## What is Mopria?

HP has been the first for many things – the first printer company to have a cloud print solution via email, the first to have AirPrint-enabled printers for iOS devices, the first to support Google Cloud Print – and now it's the first to have a Mopria-certified printer. But what is Mopria?

Founded in 2013, the Mopria Alliance is a non-profit organization with leading printer companies like HP, Canon, Samsung and Xerox, with the aim to create common standards to make it easy to print wirelessly from mobile devices.



## The HP ePrint App Transforms Your Printer

The free HP ePrint App for iOS and Android make it easy to print from your smart mobile device, whether you're at home, in the office or on the go. With the ePrint app, you can print from your phone over Wi-Fi, via the Internet to an HP ePrint printer, or directly to HP wireless direct supported printers, without the need to install any additional drivers onto your mobile device. You can even use it to print to HP Public Print Locations, like print stores, hotels and airport lounges, located all over the world.

# The Freedom to Print Anywhere, Anytime, from Any Device

*HP's mobile printing solutions help you get more done with your mobile devices.*

## HP COLOR LASERJET PRO MFP M476DW

This HP Color LaserJet Pro MFP connects your entire office to color printing, even when people are out of the office. Fast, versatile scanning lets you send documents directly to email, network folders and the cloud.

The first Mopria certified printer in the world, the M476dw lets you print easily from smartphones, tablets and notebooks at work, from home or on the move. You can even print wirelessly, directly to the printer without going through a network. With NFC-enabled mobile devices, you can enable touch-to-print to connect to and print.

Work faster than before, with the 3.5" color touchscreen that helps you access content and quickly launch tasks. Automatic two-sided printing helps you save time and reduce costs, while the 50-page automatic document feeder saves you even more printing time.



## HP OFFICEJET 150 MOBILE ALL-IN-ONE PRINTER

If you've ever wished you had an All-in-One printer while on the move, the OfficeJet 150 Mobile is for you. This mobile inkjet printer with built-in Bluetooth® wireless connectivity lets you print, scan and copy anywhere you go. Scan straight to your PC, email, USB drive or memory cards, and copy up to legal-size documents – it's easy to do with the 2.36" color touchscreen controls. A long-lasting lithium ion battery lets you print up to 500 pages on a single charge, and you can print up to 22ppm (pages per minute) black/18ppm color.



### HP 1200W MOBILE PRINT ACCESSORY

Want to print wirelessly but don't have a printer with Wi-Fi built in? No worries – the HP 1200w Mobile Print easily adds wireless direct printing and touch-to-print technology to your existing HP printer or MFP. Just plug it into a USB port on supported HP devices, install, and you've enabled wireless printing for the office.

Then simply connect your mobile device to the printer the same way you would discover a wireless network. You can even tap to connect with NFC-enabled smart devices. Both wireless direct and touch-to-print technologies use a peer-to-peer connection, helping mobile users print without accessing the company network, while print files are kept safe with 128-bit encryption.



### HP OFFICEJET PRO X576DW PRINTER

The OfficeJet Pro X576dw printer looks and runs like a laser, but costs half as much per page, while printing up to twice the speed of laser, using HP PageWide Technology. You can print up to 70 pages per minute, making it the world's fastest desktop printer, while saving paper automatically and using up to 50% less energy than lasers. A 4.3" color touchscreen helps you print, copy, scan, fax and send digital files with intuitive controls, and you can print wirelessly from PCs, tablets, and smartphones from virtually anywhere using HP ePrint.



### HP JETDIRECT 2800W NFC/WIRELESS DIRECT ACCESSORY

The Jetdirect 2800w turns your existing HP printer into an NFC-enabled device. With the Jetdirect 2800w installed, all you have to do is tap a NFC-capable smartphone or tablet to connect to the printer and print wirelessly from your mobile device. You can also enable wireless printing, with a secure peer-to-peer connection from smartphones, tablets and laptops. The Jetdirect 2800w keeps your company secure, with the ability to let mobile device users print without accessing the network.





# The Growth of Cybercrime and the Urgent Need for Cybersecurity

In 2014 alone, companies in Singapore lost nearly S\$2 billion due to data loss or unplanned downtime caused by cybercrime. Cybercriminals attacked SingPass, karaoke chain KBox and Standard Chartered Bank, illegally accessing accounts and stealing customer data.

A report from the Center for Strategic and International Studies places the likely annual cost to the global economy from cybercrime at more than US\$400 billion. This number is only expected to grow; as more people and businesses move online, the more opportunities arise for cybercriminals to strike.

As threats continue to evolve, so do the methods and organizations needed to counter it. Singapore is stepping up its defenses against cybercrime with the launch of a central agency in April 2015, and the appointment of a minister-in-charge of cybersecurity. The opening of the agency follows the establishment of an Interpol Global Complex for Innovation (IGCI) center in Singapore dedicated to fighting cybercrime.

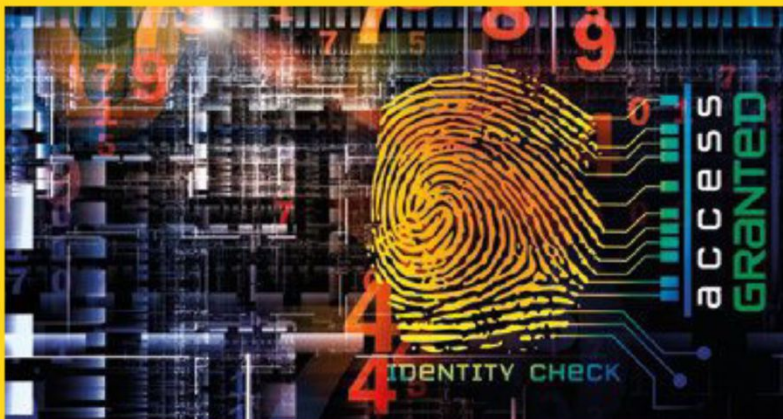
Similarly, businesses need to stay ahead of cyberthreats, lest they become victims of cybercriminals themselves. With the increasing sophistication of cyberattacks, companies need skilled individuals and teams to protect themselves, as a vulnerable online presence can become a crippling competitive disadvantage.

## CYBERCRIME IS A GROWTH INDUSTRY, AND SO IS CYBERSECURITY

With the rise in cybercrime comes a rising need for capable cybersecurity professionals. Demand for cybersecurity professionals has been growing more than 3.5 times faster than that for other IT jobs, making it one of the most in-demand sectors in the IT industry.

Singapore's Infocomm Development Authority's (IDA) Infocomm Technology Roadmap 2012 estimated that the global cybersecurity market was worth US\$63.7 million that year and is expected to reach US\$120.1 billion by 2017.

In the United States, a \$25 million grant was recently announced in early 2015 to support cybersecurity education, as the growth of cybercrime has highlighted the need for cybersecurity experts. According to the White House press release, the demand for cybersecurity professionals is growing 12 times faster than the US domestic job market.



## New Singapore Cyber-security Agency to be Set Up in April

**Early in 2015, the Singapore government announced that it would launch a new national cybersecurity agency, which will start operations in April, which will consolidate and centralize oversight of cybersecurity functions. It was also announced that a new portfolio of minister-in-charge of cybersecurity, Yaacob Ibrahim, Minister for Communications and Information, would fill the post.**

## Interpol Sets Up New Complex to Counter Cybercrime in Singapore

**In 2010, Singapore was chosen by Interpol as the location for the Interpol Global Complex for Innovation (IGCI). The IGCI is a cutting-edge research and development facility that will complement Interpol's General Secretariat in France, with a focus on digital security. Housed in a state-of-the-art building six storeys high, the IGCI will boast a forensic laboratory to support digital crime investigations, research to analyze cyberattacks and counter cybercrimes.**



## WHERE SHOULD YOU GO TO BECOME A CYBERSECURITY PROFESSIONAL?

Northumbria University, Newcastle is a research-rich, business-focused, professional university with a global reputation for academic excellence. Their cybersecurity courses are now offered at MDIS.

### **Bachelor of Science (Hons) Computer Security**

*Awarded by Northumbria University, UK*

This programme provides a broad education in the theory and practice of engineering and computer technologies, with specific emphasis in the area of computer security and network systems. Students will study at the forefront of their disciplines, with modules like:

- Advanced Digital Security
- Principles of Ethical Hacking
- Ethical Hacking for Network Security

### **Bachelor of Science (Hons) Computer and Network Technology**

*Awarded by Northumbria University, UK*

This programme is designed for students to demonstrate their full potential with respect to computer networking, software development and computer hardware, in the realm of modern digital communication systems.

Both programmes' curriculum are aligned with the Cisco Certified Network Associate industrial training so that you can have the option to achieve your CCNA qualifications with the Cisco Networking Academy alongside with your degree, a major boost for your CV. Job opportunities available for graduates, to name a few, are as follows:

- |                                  |                                 |
|----------------------------------|---------------------------------|
| • Penetration Tester             | • Cybersecurity Engineer        |
| • IT Security Engineer           | • Information Security Analyst  |
| • IT Security Specialist         | • Network Operations Engineer   |
| • Security Technology Consultant | • ICT Network Security Engineer |

Duration: Full-time (16 months) and part-time (20 months)

Intake: 18 May 2015

For more information, please contact our programme consultant, Shanthan at 9846 3624 or prashanthan@mdis.edu.sg

## Is a Career in Cybersecurity for You?

Discover more about cybersecurity from distinguished experts.

### **Speakers:**

**Mr. David Bell, Associate Dean (International), Faculty of Engineering and Environment, Northumbria University, UK**

**Mr. David Siah, Chairman, Cloud Security Alliance Singapore**

### **Date:**

**24<sup>th</sup> March 2015 (Tue)**

### **Time:**

**7pm**

### **Venue:**

**O'Coffee Club (Raffles Place),  
No. 7 Raffles Place Singapore 048625  
(near Raffles Place MRT)**

### **Topics:**

- **Cybersecurity: At the Frontline Everyday**
- **Combating Internet Attacks by Infiltrating Cybercrime**
- **The Challenge of Security Capabilities Now and into the Future**
- **The Important Roles of Cybersecurity Specialists**

## A Complimentary Preview Not to be Missed

Scan QR code to register for the programme preview on 24 March 2015 (Tue). Limited seats available. Register early to avoid disappointment.



 **6247 9111/6372 1000**

 **etc@mdis.edu.sg**

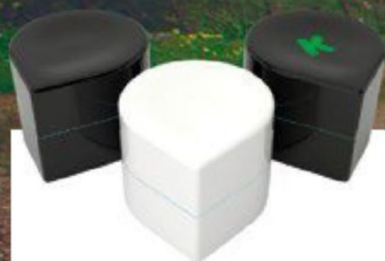
 **www.mdis.edu.sg**



# EVERYDAY SUPERHEROES

by Salehuddin Husin

Who says life must be mundane when you've got technology on your hands. You don't even have to be a genius, billionaire, playboy philanthropist too. Ok, sure, you might blow a paycheck or two, but with these gadgets, you'll be the darling of the new world. Yes, geeks are sexy now.



## **ZOTALABS POCKET PRINTER** [WWW.ZOTALABS.COM](http://WWW.ZOTALABS.COM)

You've heard of robot vacuum cleaners, but how about a robot printer? The Pocket Printer is under 11cm in diameter and weighs a measly 350g. It can print from just about any device (via Bluetooth) and on any standard sized paper. Just place it on the paper and watch the little guy print away. Batteries last for an hour on single charge and prints about 1.2 pages per minute (A4 size).

It's not speedy, but if anything, it certainly will make the mundane task of printing documents look cooler than it every has been.



## **LENOVO THINKPAD STACK** [WWW.LENOVO.COM](http://WWW.LENOVO.COM)

The ThinkPad Stack isn't a single item, it's a line of different items that you can get piecemeal and then stack them into an unholy tower of power.

Think of it as your own little tech utility belt. The ThinkPad Stack has various components: a portable HDD, a power bank, wireless access point and speakers. Instead of having various gadgets all jangling around in your bag, the Stack allows you to mix and match to get your favorite combo and combine them for convenience.



## **LEATHERMAN TREAD** [WWW.LEATHERMAN.COM](http://WWW.LEATHERMAN.COM)

Speaking of utility belts. How about an actual utility tool that even a certain caped crusader would be jealous of? It's rugged, stylish and incredibly functional. In fact, the Tread is really an ingenious design that incorporates 25-tools such as Allen keys, screwdrivers, box wrenches and even bottle opener all into one bracelet. Each link in the bracelet carries multiple tools, is made from 17-4 stainless steel and is fully customizable with both tools that you need the most and size to fit just about any wrist.





**PACIF-I SMART PACIFIER**  
[WWW.BLUEMAESTRO.COM](http://WWW.BLUEMAESTRO.COM)

There's no typo. There is such a thing as a smart pacifier. We know that some of you guys are raising the next generation of geeks and as fellow geeks, have taken it upon ourselves to ensure that you have the best tech to use. This Bluetooth pacifier doubles as a thermometer and tracking device to make sure your little one doesn't stray too far from your watchful eyes. There's also an alarm that you can trigger if it's missing. Basically it's something we'd all have wanted if we were babies today.



**WOCKET SMART WALLET**  
[WWW.WOCKETWALLET.COM](http://WWW.WOCKETWALLET.COM)

Wocket might sound a little silly at first, but the product they are peddling is anything but. The Smart Wallet is a gadget the size of a wallet with a screen. You input your card details (any card, from Mastercard to VISA) and it'll save them in its memory. When you want to use a certain saved card, you select the card from the menu and it'll securely flash that card's detail into its custom card, which you can then use. Like we said, sounds silly, but we want one.



**FUEL3D SCANIFY**  
[WWW.FUEL-3D.COM](http://WWW.FUEL-3D.COM)

With 3D printing technology on the cusp of becoming mainstream, what better way to get ready for that trend than with a 3D scanner? You use the scanner like you would any camera, just point it at whatever object and shoot. You can then export to a 3D design program (like MAYA) and print! You don't know how to use MAYA? Lucky for you, we knew that was going to be an issue so we've done some quick MAYA tutorials in recent issues of HWM. If course, you will still need a 3D printer.



# ENJOY 50% OFF ALL YOUR FAVOURITE MAGAZINES

ONE YEAR DIGITAL SUBSCRIPTION DEALS



ONLY \$41.40 (U.P. \$82.80)



ONLY \$36 (U.P. \$72)



ONLY \$41.40 (U.P. \$82.80)



ONLY \$30 (U.P. \$60)



ONLY \$36 (U.P. \$72)

READ YOUR FAVOURITE MAGAZINES ON  
TABLET OR SMARTPHONE THROUGH THESE PLATFORMS:



## HURRY, SUBSCRIBE NOW!

sphmagazines  
www.sphmagazines.com.sg



TEST

# LAB RESULTS

Every month behind the doors of our super secret gadget testing facility, the latest tech products are put through their paces using industry recognized benchmarks and our own blend of real world usage scenarios. Here are our findings.

## MORE INSIDE >

### CASIO G'MIX GBA-400

G-Shock by day, music maestro by night.

### MSI GT80 2QE TITAN SLI

Mechanical keyboard meets gaming notebook.

### RESIDENT EVIL HD REMASTER

Is a classic still a classic 3rd time around?

## HOW WE RATE:

Products are rated on a scale of **1** to **10**; **1** being so abysmal, it should be a crime to sell it, and **10** being almost perfect. Come now, nothing is perfect. An Editor's Choice may also be awarded based on unique merits.







# THE APS TO SEE

The APS-C camera is still perhaps the best compromise of all current camera technologies – with images small enough to allow for high continuous shooting rates and sensors large enough to offer great ISO capabilities for low-light performance. We put four of the top APS-C cameras to test to determine which comes out tops.

Text by *Marcus Wong*  
Photography by *Darren Chang + Vee Chin*  
Art Direction by *Ken Koh*  
Location by *The Cage*





**vs**  
CANON 7D MARK II  
•  
FUJIFILM X-T1  
•  
SAMSUNG NX1  
•  
SONY SLT-A77 II



## CANON EOS 7D MARK II

Given how well the original 7D was received, the 7D Mark II was understandably one of the most anticipated releases of 2014, as it has been a good five years since the original. Physically, there hasn't been that much of a change between the two cameras; the 7D Mark II is slightly larger on all sides, and the button layout matches the 5D Mark III more closely.

There's a larger depth of field preview button, and more importantly, the inclusion of a new AF area selection lever that doesn't do anything until you first press the AF point selection button – it then lets you toggle between a set of seven AF area modes. This alone doesn't sound all that impressive, but dive into the menus and you can set it to activate custom functions to various directions – much like on the Fujifilm X-T1.

At 820g, the 7D Mark II is the heaviest camera here and also the only traditional "DSLR" that still features a mirror box and pentaprism. The 7D Mark II doesn't feature a tilting LCD, which is a little disappointing in today's market as that seems to have become an expected standard; it is quite handy when

you can't have the viewfinder at eye-level.

Also new, is the inclusion of a RATE button and a Creative photo button, which allow you to rate your images and to quickly bring up options for changing your looks via one of Canon's Picture Styles, creating a multiple exposure image, or by in-camera HDR. Handy options to have at a push of a single button.

We like that there's a physical switch to flip between movie recording and stills capture, and that size of the start/stop button is large enough for operation by feel. The Quick Control button is also much appreciated, as that calls up a menu to allow you

to quickly adjust your settings and custom functions, allowing you to quickly customize the camera to best fit what you're shooting.

While the 7D Mark II is easily the largest camera of the group, it also has the largest battery which contributes to it having the best battery life at 670 shots (CIPA rated). It's also only camera with dual card slots, which is handy as it lets you have an instant back-up of your images, keep video and stills separate, or have extra storage for long photography sessions.



**Best battery life of the group.**



**Fixed LCD feels dated by today's standards.**



### AT A GLANCE

#### Sensor

APS-C CMOS

#### Megapixels

20.2

#### Dimensions

148.6 x 112.4 x 78.2mm

#### Weight

820g

#### Price

\$2,499



A dedicated button calls up in-camera retouching options.



A dedicated switch flips between stills and video capture.



The 7D Mark II supports CF and SD cards.



## FUJIFILM X-T1

If first impressions count, the X-T1 stands out immediately as the most retro-inspired, with a design closely matching Fujifilm's 35mm film cameras of old (like the STX-2 for example). Combined with modern-day mirrorless technology, the X-T1 is the most portable camera of the group.

Dedicated physical dials handle shutter speed, exposure compensation and ISO settings, while aperture control comes directly from the lens. There's a switch on all X-series lenses and a click wheel near to the mount that controls the aperture settings. It's an elegant solution that lends a better tactile sense than aperture rings on typical lenses, and it works really well. While the shutter dial only goes up to 1/4000s, a recent firmware update puts the front control wheel in play too; turning this wheel when electronic shutter is enabled allows you access to shutter speeds up to 1/32000s.

If you've been using a traditional DSLR for a while, you may find yourself looking for the aperture/shutter dials, or wondering why the front and rear dials only allow you for 2/3 stop adjustments in either direction, but once you

get used to it, we're fairly confident you'll find the layout allows for quick adjustments too.

As with the 7D Mark II, there's a quick select "Q" button that gives you easy access to all your commonly used settings. The four directional buttons surrounding the Menu/Ok button can be customized to act as function buttons, allowing for quick personalization of your camera. One thing we don't like though, is the button to start video recording. This is a little too small in our opinion, and its position between the power switch and the exposure compensation dial makes it a little hard to depress.

Of the four cameras featured here, the X-T1 is the most compact and the lightest at just 440g (body only with battery), and yet it still feels like all the controls are comfortably within reach. In our opinion, there are just enough custom buttons to balance between ease of use and interface clutter, plus the electronic viewfinder (EVF) is a joy to use. While there's no pop-up flash, a hotshoe mount unit is provided that folds away conveniently so you could easily leave it on all the time.

**+**  
**Lightest and most compact camera of the group.**

**—**  
**Video seems to be an after-thought for this camera.**



### AT A GLANCE

**Sensor**  
APS-C CMOS

**Megapixels**  
16.3

**Dimensions**  
129.0 x 89.8 x 46.7mm

**Weight**  
390g

**Price**  
\$1,999



While the shutter dial is marked at full stops, turning the front control wheel allows you to select in-between speeds.



The X-T1 comes with a hotshoe flash that folds down for storage.



The X-T1 has easily the slimmest profile of all the cameras in this group.

## SAMSUNG NX1

The Samsung NX1 is Samsung's first attempt at targeting professionals, and we must say they've done a highly commendable job. The electronic viewfinder is large and extremely bright, providing 100% coverage with 1.04x magnification, while the rear LCD is a gorgeous 3-inch Super AMOLED screen with tilt and touch that is a joy to use. After all, why press a tiny button multiple times just to shift a cursor to the right option when you can select it direct via touch?

Two dials adorn the top of the NX1. The four buttons on top of the left dial let you change ISO, AF mode, exposure mode, and white balance, while turning the dial itself lets you change between drive modes. We do like the implementation of a push lock on the right dial though. Depress it and it pops up, unlocking the mode dial. When done, press it down again to prevent further changes. Both dials are also textured for better feel – small touches, but ones that count.

The usual ports are found on the left of the body, with the NX 1 supporting USB 3.0 and

providing jacks for both a microphone and for external headphones for audio monitoring.

There's also a somewhat small LCD window on the top right of the camera for your basic settings, but overall the size of the NX1 feels just about right – neither too large to be bulky, nor too heavy to be tiring.

NFC has also been incorporated for easy pairing, and Wi-Fi support adds the option of remote control via the companion app on your smartphone. However, that's we never did manage to get it working on our iPhone 6, so it appears some work still needs to be done there.

Overall, the camera is extremely responsive (perhaps more so than any

other camera in the group) and we think the buttons are sensibly laid out, with everything easily within reach. You don't have to do much menu-diving to get to any particular function, and the implementation of touch on the rear screen is a great boon. The only thing that's lacking, is dual card slots for immediate backup or overflow capabilities – especially important given the large file sizes for both 28-megapixel stills and 4K video.

**+**  
**Impressive set of features packed into one camera.**

**–**  
**Noise reduction at higher ISOs is too aggressive.**



### AT A GLANCE

#### Sensor

APS-C BSI CMOS

#### Megapixels

28.2

#### Dimensions

138.5 x 102.3 x 65.8mm

#### Weight

550g

#### Price

\$1,999



Instead of a lock button you have to keep depressed, the NX1's lock button pops up when released, and locks down when engaged.



The Quick menu allows for quick adjustment of all settings – by touch.



The only thing missing is a second card slot for easy backup.



## SONY SLT-A77 II

Coming some three years after the launch of the original SLT-A77, the SLT-A77 II is Sony's update of their semi-professional APS-C camera, and perhaps more importantly, signals Sony's intent to stay invested in their single lens translucent line-up. The SLT-A77 II gains NFC and Wi-Fi capabilities (to pair with Sony's PlayMemories Mobile app that shares shots from your camera to your phone) and a new 79-point AF system that promises faster response.

The SLT-A77 II feels like a massive camera when you pick it up; more so when you have the kit SAL1650 lens attached, but of course that's a bright f/2.8 lens, so the weight is somewhat justified. The buttons on the camera are the largest and easiest to depress, and there's a raised multi-selector button that acts as a joystick for you to navigate through the menu system.

This multi-selector button is larger than the one on the Canon 7D Mark II, but we feel the added size and additional raised height allows it to be operated more comfortably with better precision. The body design allows for a sizeable grip area on the right of the

body, which helps balance out the weight somewhat. A total of 11 customizable buttons are available on the body with up to 51 assignable functions, so you can truly set this camera up as you wish.

Perhaps the biggest stand out feature on the A77 II is its 3-inch WhiteMagic articulating LCD display which not only flips up and down on a panel that flips up and out from the body of the camera, but also swivels around a joint on the panel. This means you can have the display above the camera, below it, and even tilted 90° to the side should the need arise, which makes it handy when you're trying to get pictures from those awkward angles.

**+**  
**Most flexible articulating LCD display.**

**—**  
**Lots of color noise at higher ISOs.**

The camera itself is fairly responsive, and the electronic viewfinder is fairly large and bright, with 100% coverage and 1.09% magnification. It certainly seems as though electronic viewfinders are finally beginning to come of age as the EVFs on the cameras in this shootout are excellent in terms of response time and brightness. A word of advice though, the eye sensor feels a little too sensitive. Just reaching across the viewfinder sets the sensor off; a little annoying that the LCD turns off all the time.



### AT A GLANCE

**Sensor**  
APS-C CMOS

**Megapixels**  
24.3

**Dimensions**  
142.6 x 104.2 x 80.9mm

**Weight**  
647g

**Price**  
\$1,599



The articulating LCD on the A77 II is the most flexible, allowing you to view it from any direction.



Compared to the others, the multi-selector button on the A77 II is huge, and so the easiest to operate.



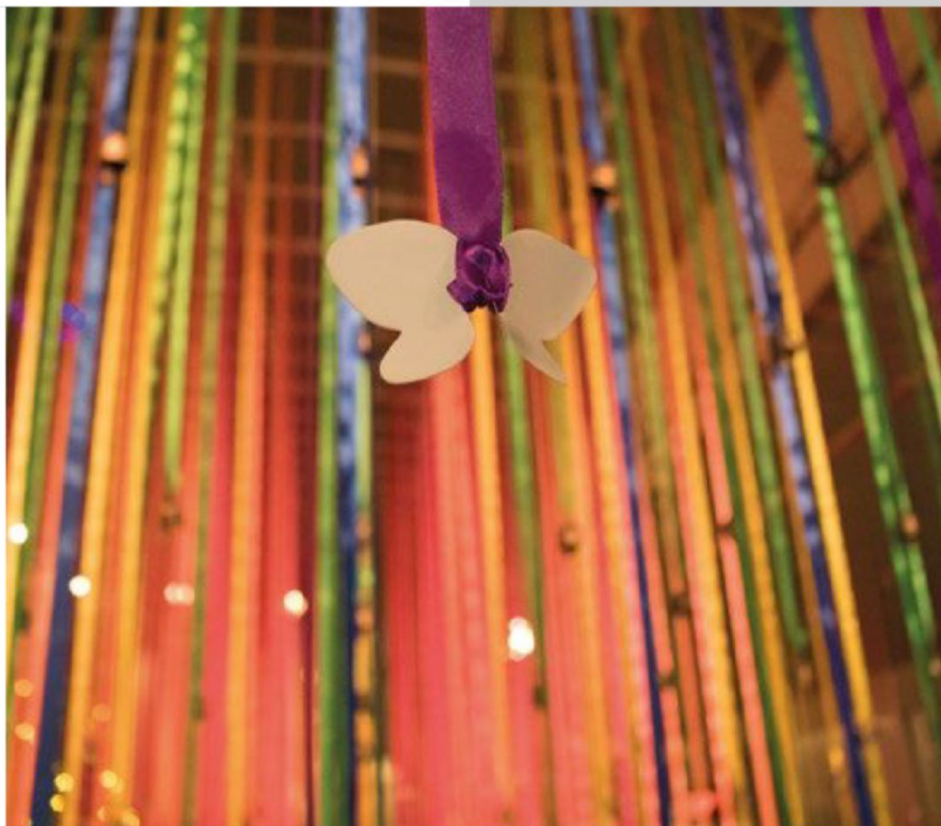
The A77II features NFC for easy pairing.

## IMAGE QUALITY & PERFORMANCE - CANON EOS 7D MARK II

Images captured with the 7D Mark II hold detail well up to ISO 6,400, with images taken at ISO 12,800 usable after a bit of post-processing. Compared to the rest, the images from the 7D Mark II are slightly warmer with a bit more in the reds and yellows. Despite being the only camera of the group with a traditional reflex mirror, it didn't feel noticeably heavier or bulkier – proving that it's the total package of lens and body that counts when you're out taking pictures.

Conversely though, the 7D Mark II's response time didn't feel significantly faster than the mirrorless counterparts – specifically the Fujifilm X-T1 and the Samsung NX 1 – so that's perhaps a sign of how far mirrorless cameras have come. Autofocus is snappy and accurate for stills and very much improved for video – Canon's Dual-Pixel autofocus system definitely seems to be worth the marketing hype – and the intelligent tracking seemed to work well most of the time.

One thing we did find though, is that seeing the shutter in the viewfinder when doing continuous shooting does seem a little more distracting compared to the uninterrupted view you get with mirrorless cameras, so that's one area where traditional DSLRs are at a slight disadvantage. In our own tests, the 7D Mark II managed an average of 10.73 frames per second, easily matching the reported burst rate (10 fps), with consistently accurate focus.



Color noise is handled fairly well even at the higher ISO levels.



Images are usable up to ISO 12,800.



## IMAGE QUALITY & PERFORMANCE - FUJIFILM X-T1

We really like the responsiveness of this camera, and this shootout hasn't changed that impression. With the latest firmware installed, the X-T1 gains an electronic shutter function that goes up to 1/32000s, and more importantly, operates completely silently which helps immensely when trying to shoot wildlife. The smaller body also helped in that regard, as you imagine it's certainly easier sneaking up to a peacock with something that's less bulky!

Despite having the sensor with the lowest resolution (16.3-megapixels), the X-T1 produces images that are full of detail with rich vibrant colors, thus proving that a good image is not just all about the megapixels. Another advantage of having a lower pixel density on your sensor is of course, better control over noise, and this is certainly evident in the images. We'd say that images taken up to ISO 12,800 are readily usable, and even images at ISO 25,600 are printable after a bit of sharpening.

One thing we do have to note though, is that at ISO 25,600 and up (the X-T1 goes up to 51,200, accessible from the menus) images develop a slight green cast which is especially noticeable in the shadow areas. The continuous shooting rate was the slowest of the bunch, at an average of 7 frames per second from our tests (it is officially rated at 8 fps), but the autofocus was accurate and reliable throughout.



The X-T1 produces sharp images with detail, proving that it's not all about megapixels.



The larger pixel pitch means even images taken at ISO 25,600 look good enough to print, especially after some sharpening in post.



## IMAGE QUALITY & PERFORMANCE - SAMSUNG NX1

The Samsung NX1 was very much a pleasant surprise in terms of the sheer amount of features packed into the camera. Touch screen shooting, a flip screen for awkward angles, and a bright, responsive viewfinder that showed very little lag made for an extremely fun camera to use. Colors in the viewfinder and on the LCD were true to life, and we liked that there was room for adjustment of the brightness settings, though we were definitely comfortable with leaving it on automatic.

Autofocus is quick and accurate, and images captured display an impressive amount of detail – as to be expected perhaps as the NX1 has the highest resolution sensor of the group at 28.2-megapixels. The camera also has an impressive continuous frame rate of about 15fps when shooting with the electronic shutter enabled and a decent buffer that goes up to about 70 shots before slowing down. The continuous autofocus was by large fairly accurate, locking on to subjects pretty well, thanks in large part to the sheer number of autofocus points it has. (205 Phase detect AF points and 209 contrast detect AF points)

We do think that Samsung has been a bit too aggressive with their noise reduction algorithms though. Noise reduction starts to kick in from as low as ISO 3,200, and when you get to ISO 12,800 and above, the camera's attempts at noise reduction actually work against the high resolution of the sensor.



The 28MP sensor of the NX1 gets you plenty of detail.



Because of the over aggressive noise reduction, the max you'll want to go up to with the NX1 is probably ISO 6,400.



## IMAGE QUALITY & PERFORMANCE - SONY SLT-A77 II

The bulkiest of the group, the SLT-A77II felt like it was the heaviest and the most unwieldy for some reason. We think it's got to do with the design of the body, and the constant f/2.8 kit lens provided; something you can probably adjust to a certain degree by your choice of lenses.

SLT-A77 II has a fast AF system that generally performs well, focusing quickly and accurately in all the situations we put it through. The exposure system is accurate, and we never had to dial in any exposure compensation throughout the time we were using it. In our tests, the continuous shoot rate actually hit close to 13 frames per second, proving that Sony has perhaps rated it very conservatively, and making it one of the fastest cameras of the group.

Images at lower ISOs have plenty of detail, though we do notice bits of color noise starting to appear from as low as ISO 800. While the camera does go up to ISO 25,600, you'll want to stay below ISO 6,400, as color noise starts to become a real issue, and one that isn't easily cleaned up in post.

Despite that, the color balance on this camera is one of the best in this group, giving us accurate white balance with little bias even at higher ISO sensitivity settings no matter the environment we placed it in.



Color noise creeps in at ISO 800.



The max sensitivity we'd go up to with the A77 II is ISO 6,400.

# T E S T - APS-C CAMERAS SHOOTOUT



MODEL	CANON EOS 7D MKII	FUJIFILM X-T1	SAMSUNG NX1	SONY SLT-A77 II
MOUNT	Canon EF/EF-S	Fujifilm X	Samsung NX	Sony/Minolta Alpha
FOCAL LENGTH MULTIPLIER	1.6x	1.5x	1.5x	1.5x
SENSOR	CMOS	CMOS	BSI-CMOS	CMOS
SENSOR SIZE	22.4 x 15mm	23.6 x 15.6mm	23.5 x 15.7mm	23.5 x 15.6mm
EFFECTIVE PIXELS	20.2 megapixels	16.3 megapixels	28.2 megapixels	24.3 megapixels
ISO SENSITIVITY	100-16000 (expandable to 51200)	100-6400 (expandable to 51200)	100-25600 (expandable to 51200)	100-25600 (stills) 100-12800 (video)
MAXIMUM SHUTTER SPEED	1/8000s	1/4000s (mechanical shutter), 1/32000s (electronic shutter)	1/8000s	1/8000s
MAX CONTINUOUS FRAME RATE	10.0 fps	8.0 fps	15.0 fps	12.0 fps
FLASH	Yes	Yes (hotshoe flash provided)	Yes	Yes
MAX MOVIE RESOLUTION	1,920 x 1,080 60p	1,920 x 1,080 60p	4,096 x 2,160 (24fps)	1,920 x 1,080 60p
WI-FI	-	Yes	Yes	Yes
VIEWFINDER	Optical pentaprism, 100% coverage, 1.00x magnification	2.36 million-dot OLED color viewfinder, 100% coverage, 0.77x magnification	2.36 million-dot OLED color viewfinder, 100% coverage, 1.04x magnification	2.36 million-dot OLED color viewfinder, 100% coverage, 1.09x magnification
MONITOR	3" TFT LCD, approx. 1.04 million dots	3" tilt LCD, approx. 1.04 million dots	3" Super AMOLED with touch and tilt, 1.036 million dots	3" TFT LCD with tilt, approx. 1.229 million dots
BATTERY LIFE (CIPA)	670 shots	350 shots	500 shots	480 shots
SIZE	148.6 x 112.4 x 78.2mm	129.0 x 89.8 x 46.7mm	138.5 x 102.3 x 65.8mm	142.6 x 104.2 x 80.9mm (excluding protrusions)
WEIGHT (BODY ONLY)	820g	390g	550g	647g
PRICE (BODY ONLY)	\$2,499	\$1,999	\$1,999	\$1,599



# THE BEST APS-C CAMERA IS



## THE FUJIFILM X-T1

We were very impressed by the X-T1 when we first reviewed it, and the recent firmware update has only added more features to be wowed by. While it doesn't have 4K video capabilities of the NX1 or the burst speed of the 7D Mark II and the SLT-A77 II, it is the most competent shooter at what matters most when you're looking for a camera. It doesn't have the color noise issues, overly aggressive noise reduction or overall bulk of the other cameras. Putting aside the fact that it is fully weather-sealed with a selection of weather-sealed lenses to go with, the X-T1 consistently got us results in all the lighting conditions we put it through. Images have good color, plenty of detail, and hold up well up to the higher ISO settings, which is essentially all you want from a good mid-range camera.







# SPEED DEMONS IN THE AIR

If speed is what you crave, then the new wave of AC-2400 wireless routers are currently the fastest available in the market. Before you setup your new network or upgrade your existing one, here are three of the latest to consider.

Text by *Kenny Yeo*

Photography by *Vernon Wong + Vee Chin*

Art Direction by *Ian Chong*

**VS**

ASUS RT-AC87U

•

LINKSYS E8350

•

NETGEAR NIGHTHAWK X4

## ASUS RT-AC87U

The ASUS RT-AC87U is the company's first product that is part of the new 802.11ac Wave 2 class of networking products. It supports up to four spatial streams, meaning a data transfer rates of up to 1,733Mbps is possible on the 5GHz band, and also supports MU-MIMO (Multi User Multiple-Input and Multiple-Output).

Under the proverbial hood, the ASUS RT-AC87U is powered by a 1GHz dual-core Broadcom BCM4709A SoC. The 5GHz radio is powered by the Quantenna QSR1000 chipset, whereas the 2.4GHz radio is powered by the Broadcom BCM4360.

Its sharp angles and aggressive design make it unmistakably an ASUS router. It looks cool, but is also very wide. This means it can only be positioned in a horizontal position. Coupled with four humongous antennas, positioning this router can be tricky. A row of LED indicators up front allows users to check the status of the router.

Behind the router lies the usual assortment of Gigabit ports - four LAN and a single WAN. There is also a USB 2.0 port, a WPS setup button, reset and power buttons. The USB 3.0 port is positioned in front, hidden behind a rubber dust cover. Although easily accessed, it also means that connecting an external storage device will break up the router's

facade. Hidden in the front left of the router are also two buttons that can instantly turn off the router's LED indicators and Wi-Fi.

The ASUS RT-AC87U uses ASUS' familiar ASUSWRT setup interface, which has been consistently upgraded over the years. It is fairly easy to navigate and straightforward to use. As you would expect from a high-end router, the usual assortment of options such as Parental Control, advanced Wi-Fi management,

real-time traffic monitoring are all here. The RT-AC87U also gets Ai Cloud 2.0, an updated cloud storage manager that allows users to access external storage devices connected to the RT-AC87U from anywhere using an accompanying app.

The latest version of ASUSWRT also includes a number of new enhancements such as Ai Protection, a built-in anti-spyware and anti-malware utility that active scans incoming packets of data; and Adaptive QoS, which uses advanced algorithms to adjust traffic based on current user

demands and loads.

The ASUS RT-AC87U is a strong performer, especially on the 5GHz band. Uplink and downlink on the 5GHz is very strong and consistent across all tested ranges - above 100Mbps even at 17m. 2.4GHz performance was not shabby either, but uplink speeds dipped quite drastically at our farthest test range of 17m.

**+**  
**Strong performance across both frequency bands and all tested ranges.**

**-**  
**Big and bulky. Odd placement of USB 3.0 port.**

### AT A GLANCE

#### Wireless

802.11 a/b/g/n/ac

#### Frequency bands

2.4GHz and 5GHz

#### Ports

1 x USB 3.0

1 x USB 2.0

#### Price

\$399



The USB 3.0 port is concealed by a rubber dust cover.



LED status indicators on the front panel makes it easy to troubleshoot should anything go wrong.



Behind the router is a USB 2.0 port, the usual assortment of a single Gigabit WAN port and four Gigabit LAN ports, reset button and WPS button.





## LINKSYS E8350

As one of the most storied names in networking, Linksys was acquired by Belkin in the early part of 2013. Under new leadership, they've showed that they're seriously about high-end consumer networking and only fitting as one of the first few brands to release an AC-2400 class router - the Linksys E8350.

Inside, the Linksys E8350 is powered by a dual-core Qualcomm IPQ8064 processor that runs at 1.4GHz. The 5GHz radio is powered by Quantenna's QSR1000 chipset, whereas the 2.4GHz radio is powered by Qualcomm's QCA9880 chipset. This allows the Linksys E8350 to support up to 1,733Mbps on its 5GHz band and 600Mbps on its 2.4GHz band.

In terms of design, the Linksys E8350 is arguably the most restrained. It does have four pretty large antennas, but they are considerably smaller than the ones found on the ASUS and Netgear routers. Additionally, the E8350 is actually relatively small in size for a high-end router. It probably wouldn't even look out of place if it was wall-mounted. While we like the E8350's compact dimensions, we were disappointed to find that it has no LED indicators, making it harder to troubleshoot errors.

Unlike the ASUS and Netgear routers, all the ports can be found on the back of the E8350. Apart from the usual single Gigabit WAN port

and four Gigabit LAN ports, the E8350 also offers a single USB 3.0 port and another USB 2.0/eSATA combo port. The Gigabit ports have LED indicators and that is the only way to know if the router is functioning properly. To the extreme right, users can also find buttons for WPS setup, and power and reset buttons.

Strangely, despite the high specifications of the router, the Linksys E8350 does not fall into the company's lineup of Smart

Wi-Fi routers. As a result, it is missing many important and useful functions such as cloud storage functionality, dynamic QoS, real-time traffic monitoring and so forth. On the flip side, navigation is straightforward and users should have no trouble setting up the router, and it does have other commonly used features such as port forwarding, DMZ and media server functionality, which should serve the needs of more basic and less fussy users well.

Overall, the Linksys E8350 performance was a little disappointing. Although its speeds on the 5GHz band were decent, it trailed both the ASUS and Netgear routers by a considerable margin, especially at close and extreme ranges. Performance on the 2.4GHz band was really poor as the E8350 recorded speeds that were less than half that of its competitors. And at 17m, it could not even complete our file transfer test.

**+**  
**Compact design.  
Competitive  
performance on  
5GHz band.**

**-**  
**Lack of features.  
Poor 2.4GHz  
performance.**



### AT A GLANCE

#### Wireless

802.11 a/b/g/n/ac

#### Frequency bands

2.4GHz and 5GHz

#### Ports

1 x USB 3.0

1 x USB 2.0/eSATA

#### Price

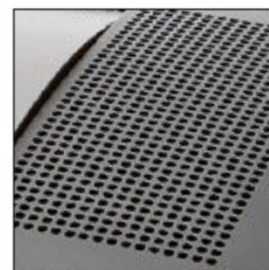
\$399



On the rear, users can find a USB 3.0 port and a USB 2.0 and eSATA combo port.



Behind are also buttons to disable Wi-Fi and another for WPS setups.



The top panel is perforated to help with cooling.

## NETGEAR NIGHTHAWK X4

The Nighthawk X4 is Netgear's first 802.11ac Wave 2 flagship router. Since it is still the early days for AC-2400 routers, the Nighthawk X4 uses a lot of the same components as its competitors in this class. Powering the router is a 1.4GHz dual-core Qualcomm IPQ8064 processor, whereas 5GHz duties are handled by the Quantenna QSR1000 chipset, and 2.4GHz duties are managed by the Qualcomm QCA9880 chipset. So like the other routers in this shootout, the Nighthawk X4 is capable of a maximum data transfer rate of 1,733Mbps on its 5GHz band and 600Mbps on its 2.4GHz band.

As for design, the Nighthawk X4 looks very much like the old R7000 which it succeeds. It is highly angular and retains a trapezoidal shape. A row of LED indicators also lets users quickly check the status of the router or if anything has gone wrong. Coupled with its four huge 16cm long antennas, the Nighthawk X4 looks very modern. It is also massive though, and can only be positioned horizontally on a surface. Wall-mounting is possible, but with a weight of around 750g, best be sure you have something strong enough to hold it to the wall.

Round the back of the router, users can find a single Gigabit WAN port and four Gigabit LAN ports, a switch to turn off the LED indicators, and the power and reset buttons.

The Nighthawk X4 also has two USB 3.0 ports and a single eSATA port for connecting external storage devices and printers, and these are located at the two sides of the router. The positioning of these ports is both good and bad. They are definitely easier to access, but having cables dangling from the sides kind of breaks its aesthetics.

For less tech-savvy users, the Nighthawk X4 comes pre-configured with a sticker indicating its SSID and also its password. So if you are not a fussy user, you could use it straight out of the box. Otherwise, users can use the Genie interface to further tweak and configure the Nighthawk X4. It has all the features and options you would expect from a high-end router, including advanced wireless settings, VPN support, real-time traffic monitoring and also Dynamic QoS, Netgear's take on an adaptive QoS system that can adjust itself on the fly to allocate bandwidth accordingly to devices based on their usage and needs.

As for performance, the Nighthawk X4 impressed us with highest downlink speeds in our tests over both the 2.4GHz and 5GHz bands. Unfortunately, uplink performance was not quite as good. On both 2.4GHz and 5GHz bands, we noticed that its uplink performance suffered quite significantly from 13 meters onwards - though this was to a lesser extent on the 5GHz band.

**+**  
**Fast and consistent  
downlink performance.  
Two USB 3.0 ports.**

**-**  
**Bulky design. Slightly  
lackluster uplink  
performance.**

### AT A GLANCE

#### Wireless

802.11 a/b/g/n/ac

#### Frequency bands

2.4GHz and 5GHz

#### Ports

2 x USB 3.0

1 x eSATA

#### Price

\$469



To the left of the router are two USB 3.0 ports.



And to the right is a single eSATA port.



If you find the LED indicators annoying, a switch at the back of the router lets you turn it off.







MODEL	ASUS RT-AC87U	LINKSYS E8350	NETGEAR NIGHTHAWK X4
NETWORKING STANDARDS	802.11 a/b/g/n/ac	802.11 a/b/g/n/ac	802.11 a/b/g/n/ac
FREQUENCY RANGE	2.4GHz & 5GHz	2.4GHz & 5GHz	2.4GHz & 5GHz
ANTENNA	4 external antennas	4 external antennas	4 external antennas
CPU	1GHz Broadcom BCM4709A	1.4GHz Qualcomm IPQ8064	1.4GHz Qualcomm IPQ8064
SECURITY	64-bit WEP, 128-bit WEP, WPA2-PSK, WPA-PSK, WPA-Enterprise, WPA2-Enterprise, WPS support	WEP, WPA/WPA2 Mixed mode, WPA2/WPA Personal, WPS support	WPA2-PSK, WPA/WPA2, WPS support
PORTS	1 x Gigabit WAN 4 x Gigabit LAN 1 x USB 3.0 1 x USB 2.0	1 x Gigabit WAN 4 x Gigabit LAN 1 x USB 3.0 1 x USB 2.0/eSATA	1 x Gigabit WAN 4 x Gigabit LAN 2 x USB 3.0 1 x eSATA
DIMENSIONS	28.9 x 16.7 x 4.7cm	25.9 x 18.3 x 5.6cm	28.5 x 18.5 x 11.2cm
WEIGHT	747g	635g	750g
PRICE	\$399	\$399	\$469

## COMPATIBILITY WOES

Although AC-2400 class routers are currently the fastest routers available, take note that they require clients with compatible 802.11ac Wave 2 chipsets to be able to fully maximize their potential. And unfortunately, at the time of writing, there are no such devices in the market yet. The current work around to this is to get two routers and have the other one operate as a bridge and connect your devices via Ethernet. It's costly and impractical for sure, but that is the only way for the time being. Alternatively, one can wait for compatible adapters such as the ASUS EA-AC87 or future USB wireless adapters to be released.



# AND THE BEST AC2400 ROUTER IS



## ASUS RT-AC87U

Of the three routers tested, the ASUS RT-AC87U is the clear leader in terms of performance. Although it may be bested by the Netgear Nighthawk X4 in some instances, the ASUS was consistently stronger on both 2.4GHz and 5GHz bands. Performance aside, it is also chock-full of useful features. For example, AiCloud 2.0 is an easy way to make your own personal cloud with any connected external storage device, Ai Protection provides additional protection against spyware and malware and real-time traffic monitoring lets you manage your networks like a pro. And yet, the ASUS RT-AC87U is easy to setup; a single-click is all it takes to enable its Adaptive QoS feature. plus the user interface is straightforward and easy to navigate. At \$399, the RT-AC87U is certainly the best package all around. The Linksys E8350 is similarly priced, but is quite stingy with features while you pay a premium for added functionality with the Netgear Nighthawk X4.



#### AT A GLANCE

**Water Resistance**  
200M

**Communication**  
Bluetooth 4.0

**Battery Life**  
Approx. 2 years

**Price**  
\$269



The G'Mix app offers Soundhound identification, music playback and a Sounder function to play with audio effects.

#### CONCLUSION

**A decent 'smart' watch for G-Shock aficionados, but needs wider software functionality.**

TESTED & RATED

**8.0**<sub>/10</sub>

**HWM**  
SINGAPORE



TAP FOR  
GALLERY

# EVEN TOUGH GUYS NEED MUSIC

## Casio G'Mix GBA-400

The G'Mix GBA-400 series represents one of Casio's newer efforts to move into the smartwatch era with targeted connected functionality. Casio calls this Mobile Link, which is basically 2-way control via Bluetooth Smart (Bluetooth 4.0) with the G-Shock+ companion mobile app. This isn't the first Casio watch with Bluetooth, but the GBA-400 is their first dedicated music control watch. It even comes with its own G'Mix app, which I'll get to later.

The GBA-400 is an analog watch with two digital displays. By default, they show time and date. When connected to either the G-Shock+ or G'Mix apps, the top display shows control info such as song title. The GBA-400 has five buttons and one dial. Of these, the large middle button activates Bluetooth,

which the dial can be mapped to music control. Just remember that it isn't a crown to set the analog hands, so don't try pulling it out. As G-Shocks go, the GBA-400 is quite modern with metallic accents on the face balancing the shiny plastic case and bezel. The face also has this fancy rotary wheel with On/Off markings to indicate Bluetooth status; a cool cosmetic touch.

As for apps, G-Shock+ is a universal control app for all Casio Mobile Link-enabled watches. When paired with the GBA-400, it offers date/time, alarm settings, phone finder and basic music controls. This allows the watch to act like a standard Bluetooth remote, but may not work on all types of music apps on your phone. If the app detects the GBA-400, you'll be prompted to install

the G'Mix app instead, a dedicated music player with more full-fledged features such as equalizer settings and baked-in Soundhound search engine. You can now identify songs by pressing a button on your watch without bringing out your phone. The downside is that the app can only play local music files. Hopefully, Casio has plans to expand this functionality because if you stream most of your music from cloud services such as Spotify, you'll get very limited use out of it at the moment.

One last thing to note, since the GBA-400 is a standard watch with smart features, it runs of regular batteries, which is supposed to last a good two years with moderate Bluetooth usage. Now, that's something I can get behind.

by Zachary Chan

TAP FOR  
GALLERY

# BEST VALUE GAMING

## ASUS ROG G751JT

### AT A GLANCE

#### Processor

Intel Core i7-4710HQ  
(2.5GHz, 6MB cache)

#### Display

17.3 inch Full HD  
(1,920 x 1,080)  
Matte IPS display

#### Graphics

NVIDIA GeForce  
GTX 970M (3GB)

#### Memory

8GB DDR3L

#### Storage

1TB HDD + 8GB  
Hybrid HDD

#### Price

\$2,198

The ASUS ROG G751 gaming notebooks come in two varieties: a beefier G751JY and the leaner G751JT. The JY version boasts bigger everything, RAM, storage and graphics card. It also costs more. The G751JT on the other hand, scales down the power for some cost savings.

Although the two are identical on the outside - same chassis, display, ports, dimensions and weight - their innards are quite different. Crucially, the differences between the two can be traced to three crucial components - the graphics card, the amount of RAM and whether SSD

storage is available.

The ASUS ROG G751JY has a NVIDIA GeForce GTX 980M, proper SSD storage and 16GB of RAM. The ROG G751JT on the other hand features a NVIDIA GeForce GTX 970M, a hybrid HDD and 8GB RAM.

Despite the patchy performance of the ASUS ROG G751JT, it has a few salient points to take note. We like the sturdy chassis, the shortcut Steam key and the fact that all of the notebook's ports are at the sides.

Another plus point in the ASUS ROG G751's favor is its keyboard. It might not be mechanical like the MSI's latest GT80, but

it's definitely a step above other gaming notebooks.

The keys have more travel, which means you get to experience more tactile feedback while gaming as opposed to regular notebooks. While we'd prefer a more pronounced backlight system, the lighting is decent enough nonetheless and suits the black and red motif well.

Where the notebook's physical aspect is a letdown is the notebook's bulky size and a hefty weight of 4.88kg. You're definitely not inclined to shuffle this gaming notebook about unless it's an absolute must. Also, the battery is not removable unlike its predecessors.





We're pleasantly surprised that the ROG G751JT has a Blu-ray writer with its price point.



The keyboard light up a fiery crimson red when the backlight's on.

#### CONCLUSION

**The ASUS ROG G571JT might not be the most powerful gaming notebook out there, but it'll give you a mighty bang for your buck.**

Speaking of battery, this notebook is best used when plugged into a wall outlet for it has a pretty poor power consumption and battery life. Our battery test pegs it to last about two and a half hours under mixed mode usage, which is less than favorable for its specs.

Complaints aside, the ROG G751JT is a budget gaming machine and a pretty good value for money at \$2,198. Still we can't help but wonder if ASUS made the best choices. 8GB of RAM is hardly optimal for gaming, especially if the machine is going to be used for a few years. Minimum requirements for games are rapidly rising and we fear that in a few years, 8GB might be the minimum required (or even be less than that) to run a game, much less run it well.

If you want a better

performing machine, we would suggest you to top up for the more powerful JY variant. At \$2,898, it's \$700 more than the JT, but the graphics upgrade alone is worth it. Even then, it's still a great notebook under \$3,000, which makes it one of the cheapest premium gaming notebooks around.

If you're gaming on a budget, there's no better option that the ROG G751JT, though with its specs, you might have to upgrade to a better machine sooner rather than later. With games powered by DirectX 12 (as well as the next generation of game engines) hitting soon, you might find that an entry level machine like the ROG G751JT won't cut it anymore in the coming years. Nonetheless, for the moment, we still recommend the ROG G751JT.

The ASUS ROG name has

normally been reserved for high-end gaming devices, so it's quite a pleasant surprise that the G751 offers great value gaming. It represents an attractive option for gamers on a budget. Admittedly, both models might not have the kind of cutting-edge hardware and it certainly is bulky, but then again, they cost a fraction of what other high-end gaming notebooks from competing brands.

by *Salehuddin Husin*

TESTED & RATED

**7.5**<sub>/10</sub>

**HWM**  
SINGAPORE





TAP FOR GALLERY

# THE BEST PHABLET AROUND?

## Xiaomi Mi Note

### AT A GLANCE

#### OS

Android 4.4.2 Jelly Bean with MIUI 6

#### Processor

Qualcomm Snapdragon 801 quad-core 2.5GHz

#### Display

5.7-inch / 1,920 x 1,080 pixels (386 ppi)

#### Storage

16GB / 64GB

#### Dimensions

155.1 x 77.6 x 6.95mm

#### Weight

161g

#### Price

2,299RMB (~\$495)  
2,799RMB (~\$600)

Xiaomi's latest phone is something of a departure from its usual fare. The 5.7-inch Mi Note phablet is a cut above the wallet-friendly offerings Xiaomi has offered in the past, and its premium design, build and specs put it in the same league as the flagship phones from Apple, Samsung and other smartphone giants. But can Xiaomi compete at the very highest levels?

The front of the Mi Note is dominated by its 5.7-inch display. Despite boasting of a larger screen size, the Mi Note actually comes out narrower and shorter than the iPhone 6 Plus.

Impressively, it also has thinner bezels, and it's about 11g lighter too. The Gorilla

Glass 3 front panel is very slightly curved at the edges, just like the iPhone 6 Plus.

The back of the device sports a '3D curved glass' rear panel, which curves at the left and right edges, someone like the display on the Samsung Galaxy Note Edge. In hand, it's somewhere between the blocky slab feel of the Galaxy Note 4, and the often slippery, rounded edge of the iPhone 6 Plus. In our opinion, Xiaomi has actually found the best balance between aesthetics and handling: curving just the back edges gives you a soft, ergonomic curve for your palm to wrap around, and yet still leaves a flat side edge for your hand to grip onto.

On the left side of the Mi Note you'll find a dual-micro and nano SIM card tray. While dual-SIM phones are nothing new, a 2-in-1 micro/nano SIM card tray is fairly novel. Both SIM card slots support TDD-LTE and FDD-LTE cellular systems, so you'll be able to use Singapore's LTE network using either SIM card.

The Mi Note's 5.7-inch display is made by Sharp/JDI and has a Full HD 1,920 x 1,080 (386ppi) pixel resolution. The LCD panel boasts a 95 percent NTSC color gamut and a contrast ratio of 1,400: 1. The screen is crisp, and pictures look fantastic, with deep contrast and vivid but not over saturated colors. If there's





Unlike Apple's iPhone 6 camera, the Mi Note's rear camera sits flush with the back of the device.



The sides of the Mi Note taper down to about 4.5mm.

#### CONCLUSION

**A premium, flagship level phablet, and at nearly half the cost too.**

one complaint we have with the display, it's that viewing angles could probably be a bit better.

Audio on the Mi Note is also quite impressive. Inside, you'll find an ESS ES9018K2M stereo digital-to-analog converter (DAC), dual ADI ADA 4896 op-amps, dual Texas Instruments OPA1612 op-amps, and two independent 44.1kHz and 48kHz clock oscillators.

In a nutshell, all this makes the Mi Note a very capable high-res (24-bit/192kHz) audio player.

The Mi Note's 13MP rear camera uses a 1/3.06-inch Sony Exmor RS IMX214 sensor and an f/2.0 aperture. It's also armed with a Philips dual-LED warm/cold flash, and optical image stabilization. Up front, there's a 4MP camera with 2µm pixel size (the same as on HTC's UltraPixel cam), which is ideal for selfies in low light. Image quality on the Mi Note is very good, and rivals any flagship phone out there. The optical image stabilization works well, and low light shots retain detail and sharpness.

The Mi Note runs on Android 4.4 with MIUI 6 installed. MIUI 6 bears a striking resemblance to iOS 7, in terms of design,

functionality and app layout. Drag down from the top of the screen and sure enough, there's a notification center with a pseudo transparent screen effect. Even specific apps like the calendar and calculator bear a striking resemblance to Apple's own. Nevertheless, MIUI 6 actually works really well. It's fluid and responsive, and everything is easy to navigate and use. It's worth noting that unlike Xiaomi's other devices, the Mi Note doesn't offer any expandable storage, so if you can afford it, you're better off getting the 64GB version.

The Mi Note is powered by a Qualcomm Snapdragon 801 2.5GHz quad-core processor with 3GB RAM. When running a benchmark, game or other processor-intensive app the Mi Note gives you the option to switch between 'Performance' or 'Balanced' mode. In Balanced mode, performance was about what you would expect from a Snapdragon 801 device, while Performance mode impressively boosted benchmark scores up to near Snapdragon 805 levels. Battery life on the Mi Note was also fairly good, and its 3,000mAh battery lasted about ten and a half hours on our video looping battery

benchmark, making it better than the iPhone 6 Plus, but slightly worse than the Galaxy Note 4.

In the four years that Xiaomi has been in business, we've been increasingly impressed with the level of quality coming out of the Beijing-based company. Each device launched has been better than the last, and the Mi Note certainly stands out as the culmination of Xiaomi's efforts. While the company is still guilty of being a bit too carefree when borrowing ideas or designs from competitors, the Mi Note proves that it doesn't really need that crutch anymore. The phablet's ergonomic handling, excellent display, good battery life, and superb camera prove that Xiaomi truly can compete at the very highest level.

by James Lu

TESTED & RATED

**9.0**<sub>/10</sub>

**HWM**  
SINGAPORE



# MIGHTIEST OF THEM ALL?

## MSI GT80 2QE Titan SLI

### AT A GLANCE

#### Processor

Intel Core i7-4980HQ  
(2.8GHz, 6MB Cache)

#### Display

18.4 inch Full HD  
(1,920 x 1,080)  
Matte LED with eDP

#### Graphics

NVIDIA GeForce  
GTX 980M SLI

#### Memory

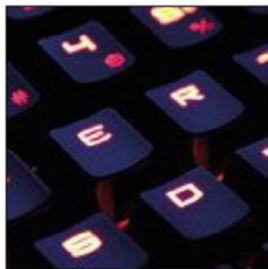
32GB

#### Storage

512GB SSD + 1TB HDD

#### Price

\$6,599



The GT80's keyboard has some of the strongest backlights we've ever seen.

We never thought we'd see the day when somebody was hardcore (or crazy) enough to put a full mechanical keyboard into a notebook. We were oh so wrong.

The MSI GT80 2QE Titan SLI is the first ever notebook with a mechanical keyboard, and it's a beast. With an 18.4-inch display, the notebook isn't for the faint of heart. Not only is it large and intimidating, it's also heavy, weighing in at 4.5KG.

Not surprisingly, its hardware specs are undeniably impressive - 32GB RAM, GTX 980M SLI and four RAID 0 128GB SSDs. Unfortunately, the notebook is one of those that suffer in the display department. This isn't really the fault of MSI

though as there aren't 18-inch screens that go above 1080p at the moment, but it's sad to see the might of the GT80 relegated to just a full HD display when it could really power a 4K screen. Of course, you could plug in a 4K monitor and do just that, but since you're buying a premium laptop, you'd expect it to contain everything.

Besides this, the first thing you'd notice is also the lack of a physical numpad. Instead, the configuration features a trackpad to the right. Look closely though and you'll realize that the numpad IS the trackpad. On the upper left of the trackpad, (where a Numlock key would be) is a toggle that allows you to between modes. We were worried that

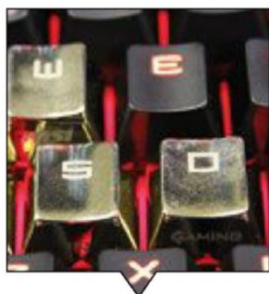
it might not be as responsive as we'd like but after using it for a while, it's actually pretty good. It'd register numbers (in numpad mode) even if we pressed them in lightly and in quick succession. It's actually a nice surprise and totally unexpected.

So what is MSI asking for their mechanical gaming behemoth? \$4,699 and that's for the base model without SLI. The base model with SLI goes for \$5,699. Our fully-specced out review set will set you back a cool \$6,599.

At the moment, the main reason anybody will consider the GT80 probably is because of its keyboard. And thankfully, it's not some novelty too. MSI has managed to cram a whole TKL mechanical







WASD keys come with gold key caps but they get smudged way too easily.

#### CONCLUSION

**If you have money to burn and don't mind paying a premium for a great gaming notebook, the MSI GT80 2QE Titan SLI is the machine you want.**

keyboard (Cherry MX Brown keys no less) into it. It definitely adds to its bulk, but it's an impressive machine nonetheless. The Cherry Brown keys are perfect for gaming due to their responsiveness, and using the GT80 felt great, something we never thought we'd say about a notebook keyboard.

To that end, we actually find ourselves at an impasse. The GT80 2QE Titan SLI is a wondrous machine, and we found ourselves liking it a whole lot because of the keyboard and it has really spoiled us. I'll even go as far as to say I'd pass on the SLI and the 32GB RAM, even the i7-4980HQ processor but I can't give up the keyboard.

There is one glaring problem with the design though and we'd be remiss if we didn't point out that the GT80 doesn't have a palm rest. This is due to the trackpad being on the side. And because the notebook is as thick as it is, the drop off is quite steep. MSI does throw in a free wrist rest, but it feels like a generic one and not one that's customized for the GT80, so be warned that

prolonged gaming will leave you sore.

To say our souped up review unit is extravagant is an understatement, but other than the keyboard, it doesn't really perform any better than its peers. Yes, it is superior to just about every other single GPU notebook out there, but no significant improvements over other SLI machines like the Aftershock Titan V2.1 or Aorus X7 Pro.

While the GT80 posted great scores in PC Mark 8 (which tested general performance), it trailed Aftershock's Titan by a fair bit in 3D Mark's Fire Strike (which tests high end notebook and desktops). Aftershock's machine posted a score of 15891, while the GT80 scored 13424. We figure the variance might be due to the fact that the GT80 is running slightly hotter than Aftershock's Titan. GPU-Z clocked the GT80's GPU temperature at 74 degrees, hotter than Aftershock's 72. A higher temperature might cause NVIDIA's drivers to throttle the performance a bit to cool the GPU down. Game performance was about the same though, with

the GT80 averaging 113 FPS on Shadow of Mordor (Ultra settings) while the Aftershock Titan had a 109 FPS average.

We will give MSI props for integrating one of the last pieces of gaming tech - a mechanical keyboard - into a notebook, but it doesn't make monetary sense to fork out so much just for it.

If money is of no concern for you, then by all means go for The GT80. There is nothing else in the market like it at all. This is the ultimate machine for bragging rights.

For the more practical gamer, it makes more sense to go with either Aftershock or Aorus, get your own separate mechanical keyboard and still have money left over for games.

by Salehuddin Husin

TESTED & RATED

**8.0**<sub>/10</sub>

**HWM**  
SINGAPORE

## AT A GLANCE

**Type**  
4K LED LCD with  
local dimming

**Size**  
65-inches

**Refresh Rate**  
Motionflow XR 800Hz

**HDMI Ports**  
4

**Price**  
\$8,999



The multi-angle speakers produce great sound, and the distracting side LEDs can be turned off.

## CONCLUSION

**A solid, if not pricey, 4K TV with very good image quality and great sound.**

# GENTLE DOES IT

## Sony Bravia KD-65S9000B Curved 4K TV

Sony is no stranger to curved TVs, as it has made a curved 1080p set before; but the 65-inch S9000B we've here is the Japanese company's first curved 4K TV. Unlike the curved sets we've seen from Samsung, Sony has opted for a gentler curvature, which with the lights dimmed, is hard to differentiate from a flatscreen unless you pay attention to the corners. Sporting rounded sides, the S9000B isn't as slim Samsung 2014 flagship curved TV, the HU9000, either. But that's not to say it doesn't look good; it just doesn't look as flashy. Like some of its flatscreen cousins, I do love the fact that you can move the S9000B's metal feet inwards to accommodate a smaller TV console.

In more ways than one, the S9000B can be seen as the curved version of the X9000B, Sony's flagship 4K flatscreen in 2014, with features like a 4K panel aided by the company's Triluminos color tech, X-tended Dynamic Range backlighting algorithm, local dimming, and DVB-T2 support. It does lose the

X9000B's 'Magnetic Fluid Speakers', but to Sony's credit, the 4.2-channel, multi-angle speakers on the S9000B actually sounded mighty good. Till date, I still remember the realistic car crash audio sequence during the museum scene from *Superman Returns*.

Picture-wise, 4K content looked great on this TV, exhibiting good depth and an awful lot of detail (as it should be). I did most of my testing with a tweaked Cinema 1 preset as it has less processing features turned on than Cinema 2. I found grayscale tracking to be good and gamma came in higher than 2.3. The short version of it: a pretty contrasty picture with accurate colors and sufficiently deep blacks out of the box. I did notice a bit of crushing in the blacks though. Pulling gamma closer to 2.2, something I always recommend for family rooms with ambient light, alleviated the situation a bit.

That said, I don't want to take anything away from Sony's local dimming tech, which ranks right up

there with Samsung's. LED Dynamic Control is the setting that controls it, and I had the best experience (less obvious backlight transitions in a dark room) with it set to Low. I also watched some sports and action titles on the S9000B, and found motion resolution to be high. For daytime viewing, the Impulse setting for MotionFlow may bit a tad dim; if you think so too, I suggest the Clear Plus or Clear setting.

So, between Sony's S9000B and Samsung's HU9000, which do I recommend? It's a tough call, really. Both have good black levels (the Samsung's black level response is just a wee bit better), scale non-4K content well, exhibit vibrant colors, handle 3D decently, produce high motion resolution, and possess a good set of smart TV features. The comparatively plain Jane S9000B has a slight edge in sound quality, but the flashier HU9000 can be (partly) upgraded with an external box.

by Ng Chong Seng

TESTED &amp; RATED

8.5/10

HWM  
SINGAPORE



#### AT A GLANCE

**Developer**  
Capcom

**Publisher**  
Capcom

**Genre**  
Survival Horror

**Platform**  
Xbox 360, PS3, Xbox  
One, PS4, PC

**Players**  
Single



The textures for some miscellaneous 3D models are ugly as sin. Just look at the pedestal!

#### CONCLUSION

**Oldie but still a goodie! Every generation should experience what Resident Evil is really all about.**

TESTED & RATED

**9.0**<sub>/10</sub>

**HWM**  
SINGAPORE

# BACK TO THE ROOT OF ALL EVIL

## Resident Evil HD Remaster

As a remake of the seminal PSOne classic, Resident Evil HD already has pedigree going for it. The fact that it's basically a port of the Gamecube remake (which is still one of Capcom's best remakes to date) basically means unless Capcom screws up royally, there's no way the game could suck. Good news, it doesn't. Mostly.

The gameplay's the same. You choose either Jill or Chris and then proceed to escape from the Spencer mansion, collecting keys, herbs and zombie bites along the way. Even the original's archaic control scheme returns, though there's an optional modern scheme. Ironically, the original control scheme is much better than the more responsive, newer one. Due to the responsiveness of the modern scheme, you can easily be moving the wrong way when the camera angle changes, which could potentially kill you in this game.

While this is easily fixed (use the original controls, duh!), there's another more glaring issue that probably will never be fixed. At certain points of the game, there are FMV cutscenes that trigger. We don't know if it's the upscaling to HD or what, but they are a blurry pixelated mess. It's painful to watch them sometimes. The graphical issues don't stop there too. For a HD remaster of a previous HD remake, there are some incredibly low-res textures left behind that you wonder if whoever was in charge of them knew the meaning of HD.

Apart from these graphical nitpicks, the game is still as great as it was on the Gamecube and just as hard. There are even new costumes added (the BSAA ones) as well as Residentevil.net integration, though that's nowhere near as extensive as the integration seen in Revelations or Resident Evil 6.

Since it's a port of the Gamecube remake, it retains all the new dialog and event make it overs. If you're nostalgic like me though, I actually prefer the original's weird and corny dialog over the more serious tone of the remake. There are still plenty of cringe-worthy laugh out loud moments (like when Barry bravely suggests Jill go investigate a weird sound while he guards the elevator), but those are sadly now few and far between.

Nonetheless, for the asking price, it's a no brainer that buying this is one of the easiest choices you'll ever have to make this generation. The story may be hackneyed and clichéd and the pre-rendered backgrounds out of touch, but the gameplay's still as great as it was back when the game came out on the Gamecube and will be twenty years from now.

by Salehuddin Husin



FEATURE

# HOW XIAOMI ROLLS

■ An awful lot of people like to compare Xiaomi to Apple, and its founder and CEO Lei Jun to the late Steve Jobs. Sure, there are parallels to be drawn, from the Apple-like design of certain Xiaomi products, Lei's track record in other industries, and his minimalist presentation slides at launch events - but you'd be a fool to think that these are enough to propel the young upstart to one of the leading smartphone vendors in China and its latest US\$46 billion valuation. In fact, the two aforementioned examples are just consumer-facing manifestations of Xiaomi's strategy, and they offer no explanations on what really contributes to its runaway success.

Text by *Ng Chong Seng*







# FOR THE USERS, WITH THE USERS

Steve Jobs once said: "A lot of times, people don't know what they want until you show it to them." That might be true many years back, but is increasingly less so in this internet and social media age. From the days of MIUI being just an Android-based firmware to the current Mi Note flagship phablet, Xiaomi has always solicited feedback from its users and figuring them in product design and features.

According to Hugo Barra, one of Xiaomi's eight vice presidents and the one leading the company's international expansion, the barely-5-year-old company receives one million pieces of user feedback per day, covering all aspects of Xiaomi's products and services, from phones to UI to cloud offerings. And if a feasible suggestion or a critical bug came to the attention of its product managers (who spend an inordinate amount of time gathering said feedback), the engineering team would be all over it in a matter of hours. This constant finger on the consumers' pulse is what allows Xiaomi to do something that we don't usually see from other phone makers: weekly hardware and software updates.

Of course, it's not as if other device makers don't have a feedback channel. But Xiaomi goes out of the way to make its users feel involved and appreciated. Take a look at the MIUI forums, and you'll notice old-timers, moderators, and Xiaomi insiders actively answering questions from new users. Fire up any of its localized Facebook pages (or its Chinese Weibo page), and you'll see constant fan engagement, be it responding to queries or creating awareness for an upcoming product or sale. Go to a Mi fans gathering, and you'll find out that many volunteered to help out without expecting any returns, except for maybe a t-shirt at the end of the day. I once asked a Mi fan why he is

*"Take a look at the MIUI forums, and you'll notice old-timers, moderators, and Xiaomi insiders actively answering questions from new users."*

so passionate about the company, and he said: "Because Xiaomi is all about us." Xiaomi has a Chinese marketing slogan "为发烧而生", which can be loosely taken to mean that the company is born to create exciting products for its users. Brilliant marketing or wise mission statement? You decide.

Here's another anecdote. When I was in Beijing recently for the Mi Note announcement, I noticed that seats at the front and center were not reserved for the media. Instead, they were for - you guessed it - the Mi fans. It's a great PR move (P as in public, not press), because frankly speaking, making the press happy doesn't build brand loyalty or move sales. Making the users happy, on the other hand, does. If you're looking for a case study that shows a successful blend of naturally occurring word-of-mouth and company-driven word-of-mouth marketing, this is it.

## NOT JUST A LOW PRICE STRATEGY

Xiaomi's retail strategy, or rather, online-only strategy also pays off big time. For those unaware, there's no way to buy a Xiaomi phone in a brick and mortar store; the only official way to land one is through its e-commerce store. Sure, there are Mi Homes (Xiaomi's own physical retail stores) and telco partners, but the former don't sell phones (only accessories and Wi-Fi-only Mi Pad tablets) and the latter require you to sign a contract.

Heck, even as I write, the Redmi 1S smartphone and Mi Band activity tracker are listed as out of stock on Mi Singapore's online store. The primary reason is because Xiaomi's sales model isn't all about volume; it's partly a learning model too. By keeping inventory low and selling products in batches (weekly flash sales are common for Xiaomi), it's able to more accurately predict future demand, as well as make constant hardware tweaks based on feedback. For a small company, it makes tremendous sense from an after sales and support standpoint too. Say, in the event that a faulty component needs to be swapped out, it's easier for service centers to handle 10,000 requests than 1,000,000 requests at the same time.

Of course, many have accused that limiting supply is just Xiaomi's way to generate demand. But limiting supply won't increase demand





if a product isn't desirable in the first place. It's easy to point to the company's sell-at-near-cost strategy, which enables (forces?) it to consistently price its devices below comparable ones from competitors, as the reason for the demand; but this is an easily copied *modus operandi*, as recent offerings from ASUS, Huawei, Lenovo, and ZTE will tell you. The brilliance of Xiaomi is its ability to weave the premium design and quality user experience story across its entire portfolio, even for its budget smartphones and accessories like power banks. Consider this: for mainstream users, Xiaomi's Redmi phones are seen as "low-cost smartphones with good design and UX"; for enthusiasts, the Mi phones are "nicely designed, high-spec'd smartphones that are affordably priced".

Notice the profound differences in the similarities of these two statements?

Now, one would argue that this willingness to accept low profit margins on hardware isn't sustainable in the long run. Surely, as Xiaomi sells more and more smartphones globally, it has to make up for the profits somewhere? Its e-commerce business is doing very well in Greater China, but can that be replicated in other territories, like India and Latin America? The Mi Note, Xiaomi's most expensive smartphone to date, can be seen as an attempt to increase the average selling price of its phones, but it's too early to say that it's going to be a trend. Even if that's Xiaomi's intention, I'll posit that at least in the next few years, it'd only happen to high-end models, which are typically snapped up by the more affluent, and margins can be higher. Case in point: the next budget Redmi 2 is expected to cost about the same as the Redmi 1S, which makes sense when you consider the international markets Xiaomi is entering, as well as the competition it's up against there (e.g., the other Chinese players, Micromax in India).

#### FOCUSES ON FEW PRODUCTS

Which brings me to the point on what does Xiaomi actually make. Beyond smartphones, tablets, and their related, small ticket accessories like replacement batteries, cases, and screen protectors, the third largest e-commerce platform in China also sells a boatload of other stuff, from toy rabbit mascots, power banks, headphones, Bluetooth speakers, and fitness trackers to set-top boxes, wireless

routers, IP cameras, air purifiers, and 4K TVs, with many of them sporting a Mi badge.

If you think that Xiaomi is crazy to make so many products, don't. As revealed by Lei Jun, the company has always focused on just three products: phone, router, and TV. The phone is obvious, as that's the product it started off with, and it fits right into Xiaomi's current strategy of it being the main device for controlling other smart devices in the home. With the increasing popularity of 4K and over-the-top services, the TV part is understandable too. What about the router? Well, you do need something to link all your devices together, get them onto the network, and connect them to the cloud, don't you?

For the other products, they're actually made by the 20+ companies that Xiaomi has invested in or collaborated with. For example, the Xiaoyi IP camera comes from Shanghai Xiaoyi Tech; the Mi Power Banks from JiangSu Zimi (or ZMI); the Mi In-ear Headphones from 1More Design; the Mi Band from Huami Tech; and the Mi Air Purifier from Zhimi Tech. To strengthen the software and services aspects of

its ecosystem, Xiaomi is also an investor of Xunlei (for video content and storage acceleration applications); Westhouse (a game developer owned by Kingsoft); Youku (China's biggest online video site); and iQiyi (a super-popular online video portal in China).

There's no question that this strategy of investing in third-party companies (many of which are startups) and selling their products on Xiaomi's e-commerce platform has worked out very well for all parties. For Xiaomi, it's able to build up its ecosystem without taking on all the risks; for its partners, they're associating their products with the hottest tech brand in China at the moment.

Moving forward, the home continues to be the next frontier for Xiaomi, as its recent investment in Midea (a Chinese electrical appliance maker that makes refrigerators, washing machines, and ovens) and the development of a "smart module" that aims to turn any device into a smart device clearly signal. What's different now compared to a few years back is that Xiaomi should have an easier time persuading third parties to join its ecosystem. After all, this is a brand that has sold 61 million smartphones in 2014, and is gunning for 100 million in 2015. **HMM**

**"The brilliance of Xiaomi is its ability to weave the premium design and quality user experience story across its entire portfolio."**



# SUBSCRIBE TO HWM



**ENJOY 20%  
SAVINGS WHEN  
YOU SUBSCRIBE NOW!**

- 12-month subscription of HWM  
at only \$66.20 (U.P. \$82.80)
- 24-month subscription of HWM  
at only \$132.40 (U.P. \$165.60)

**Log on to [www.hardwaremag.com](http://www.hardwaremag.com) to subscribe!**

This subscription promotion is only valid for the print edition, when signing up at [www.hardwaremag.com](http://www.hardwaremag.com), for the sale period of the March 2015 edition. Your subscription will commence with the May 2015 issue. Current print subscribers may also enjoy this subscription promotion (the new subscription period will automatically start when the current one expires). The subscription rate and offer are applicable to Singapore addresses only. Subscriptions are non-refundable and non-transferable. Please allow about four to six working days from the magazine release date for postage. Subscribers will be informed by post to collect their gifts (where applicable). Subscribers' information may be used in future marketing or promotional activities. Gifts are issued on a first-come, first-served basis, and are while stocks last. SPH Magazines reserves the right to amend or replace gifts if stocks run out. SPH Magazines and the sponsor shall not be liable for any loss or damage suffered by the subscriber or any party in accepting, possessing, using or consuming the gifts. By providing the information set out in the subscription form and submitting the same to SPH Magazines, you confirm that you have read, understood and consent to the terms of this subscription and also to the collection, use or disclosure of any personal data by SPH Magazines for the purposes of the subscription, in accordance with its Data Protection Policy available at [www.sphmagazines.com.sg](http://www.sphmagazines.com.sg). For subscription enquiries, call 6388-3838 or e-mail [circs@sph.com.sg](mailto:circs@sph.com.sg).

LEARN

# THE PLAYSTATION SECOND SCREEN EXPERIENCE

The PS4 is great gaming system, especially with recent updates. Remote Play is fully up and running, as are its second screen experiences. It sounds great, but getting them set up and working can be a major headache. Luckily, we're here to set the record straight on what you need to do.

Text by *Salehuddin Husin*  
Art Direction by *Ian Chong*

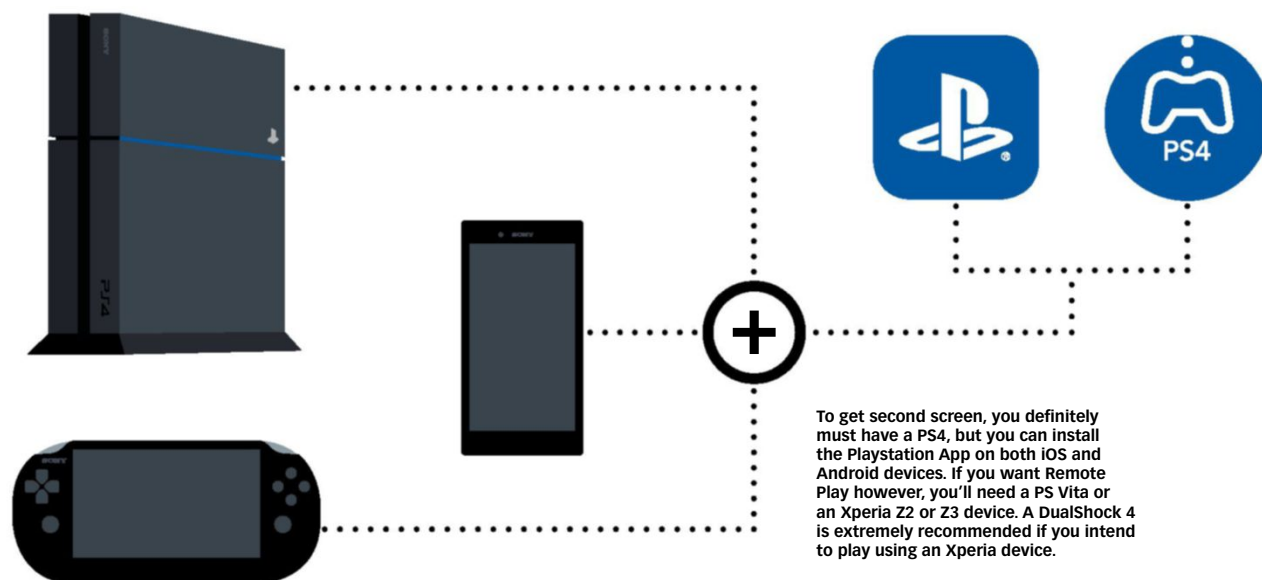


## MORE INSIDE >

- PORTING ITUNES LIBRARY
- ESSENTIAL GAMING COMPANIONS



# WHAT YOU'LL NEED:



## THE PLAYSTATION APP

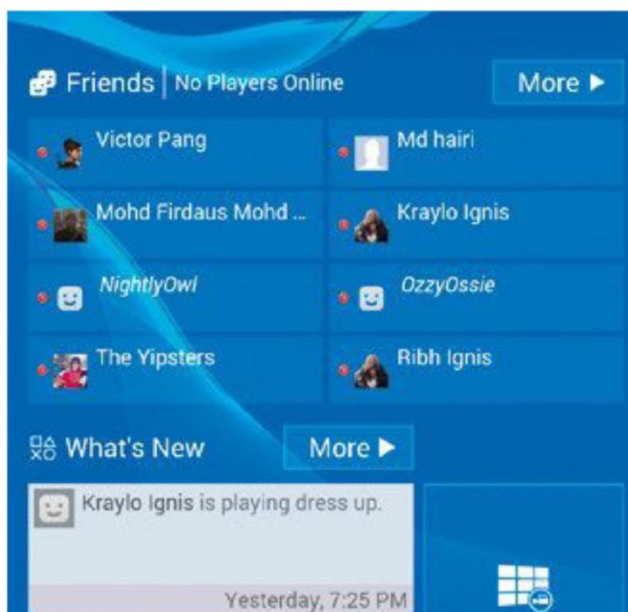
The Playstation App though is available to everybody with a smart phone or tablet. You can get it from your device's app store and install it like you would any device. At its most basic level, it allows you to access some features of the PSN like notifications and messages as well as access the PSN store. There are other features on the second section of the app that but those mainly are glorified web links which open links to Sony's page. You can connect to your PS4 but it has to be on the same network as you, which means you can't access it if you're away from your PS4, but this allows you to use your phone as a second screen experience in certain games that support it. Arguably the most popular feature is that it transforms your second screen device into a touchscreen keyboard, which allows faster typing than on the controller.

## HOW TO GET IT RUNNING

The app is available to all smart devices, be it tablet or phones and you can simply download it from the whatever app store your device uses. Install is as you would any app but have your PSN credentials handy as you'll need them to log in. You can't use the Playstation App on multiple accounts at once, so if you're on PSN with a multitude of accounts, you have log out and then log back in to change accounts.

## SECOND SCREEN

Near the bottom of the app, there's an icon called Connect to PS4. This only works if you're on the same network as the PS4, unlike the Remote Play app. You also need to be able to access the PS4 to setup the connection. On the PS4, go into Settings, then Playstation App Connection Settings and select Add Device. There should be a new screen with your PS4 id that pops up. Take note of that and log back in to the Playstation App of your smart device. Log in and then select Connect to PS4 and when prompted, enter the number you got earlier. This will bind your device and your PS4. One important thing we have to stress. You HAVE to be on the same network to be connected.



## REMOTE PLAY

The second part of the Sony's second screen plans is Remote Play, which is only available on Xperia devices (Z2 and Z3 series only) as well as the PS Vita. Remote Play basically lets your PS4 stream its games onto your mobile screen. The processing is still done by the PS4, but you'll be able to play them as if they were running on your phone. You don't even need a PS4 controller if you have an Xperia phone.

## HOW TO GET IT RUNNING

**PS Vita:** Find the PS4 Link icon on the XMB. Select it. That's pretty much all there is to it. If you haven't connected to a PS4 before, you'll be asked to enter the authentication key similar to what happened with the Playstation App. So you enter the key and that's it, your PS Vita is paired and ready for Remote Play. Remote Play will only work on WiFi (and even then you need one with high speed) so if you have one of the PS Vita's with 3G, you won't be able to use it to connect.

**Xperia devices:** If you're on a Xperia device, you need to visit the Google Play store to get the app. Search for 'Remote Play' and get the first one that pops up called PS4 Remote Play. Install it as you would any app and then run it normally.

Setup is similar to the PS Vita but we suggest you get all things ready on your Xperia device first. Navigate to Settings on the Xperia device and go to Settings > Video Quality for Remote Play. If you'll be playing on a network with high speed, put the video quality on high if not, leave it at medium.

There's not much of a noticeable difference between high or medium, especially if you're using an Xperia smartphone to play. Next you have to select what PS4 you connect to so hit the 'Change PS4 to Connect To' option on your Xperia device. Normally, it'd auto detect any PS4 on the same network but assuming it doesn't hit the 'Skip' button and follow the instructions and input the number code you get at the end.

Once you've set up all the permissions and tinkered around with the settings, start the Remote Play app on your Xperia device. As long as your PS4 is on or on standby mode, your Xperia device should be able to connect with no issue.

That's pretty much it. You're all set for Remote Play on your Xperia device.



## GAME CONTROLLER MOUNT

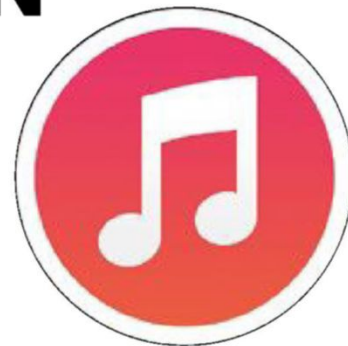
If you're using an Xperia Z2 or Z3 device to Remote Play, you might be interested in getting the GCM10 attachment from Sony. The GCM10 (Game Controller Mount), retails for \$48 and is available at most Sony stores. It'll clip on to your DualShock 4 and to your Xperia device via a suction mechanism. While there are cheaper third party alternatives, Sony's is the only one (that we know of) that uses suction to keep your Xperia device secure. The third party ones that we've seen all use hinges and screws to hold your device in place. Depending on your budget, you might want to go the cheaper route but the GCM10 seems to be a quality build and as specialized first party attachment goes, isn't too much of a rip-off.





# MOVING YOUR MAC'S ITUNES LIBRARY TO AN EXTERNAL DRIVE

by *Kenny Yeo*



SSDs have never been more affordable and now is the time to upgrade. However, capacity is probably a stumbling block for most users. While 1TB hard disk drives are easy to come by and affordable, an equivalent 1TB SSD costs substantially more and is not for everyone. Furthermore, remember that most SSDs need to have around 15% to 20% of their capacity free to perform optimally.

This means that some form of drive maintenance and cleanup is necessary for most users who are transitioning from a mechanical hard disk drive. Fortunately, it is relatively simple to free up space by moving your entire iTunes library onto an external hard disk drive.

## 1) BACKUP

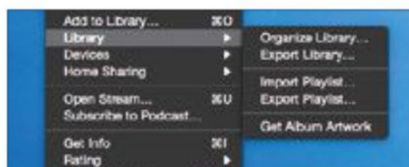
Before we begin, we recommend backing up all your data, just in case something goes wrong. It's good practice anyway. You can do so using Time Machine.



## 2) CONSOLIDATING FILES

Before we begin, we need to prepare the iTunes library by making sure all of your media files are in one place. You can do this by using the Organize Library function in iTunes.

Open iTunes and click on "File" in the Menu Bar, then head to "Library" to find the "Organize Library" feature. Check the "Consolidate Library" option. This ensures all of your files are located in the iTunes Media folder. We are not using the second option because it might miss out on some files.



## 3) DOUBLE-CHECKING

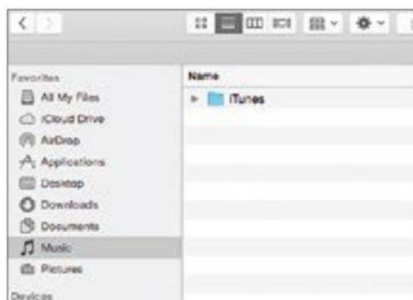
If you have moved your iTunes library in the past, it is best to double-check the location iTunes is using for accessing your library files. You can do this by going to the menu-bar and selecting "iTunes" and then "Preferences."

Then click on the "Advanced" tab, and you will be presented with the location of your iTunes Media folder. By default, it should be in the "Music" folder of your home directory.



## 4) MOVING THE FOLDER

Now connect the external hard disk drive that you want to move your iTunes library to. Then open Finder and select the "Music" folder in the left sidebar. You should see a folder that is labelled "iTunes." Click and drag that folder onto the external hard drive icon on your desktop. Alternatively, if you want to move it to a specific folder on your external hard drive, you could also open another Finder window and go to the folder you want to move your iTunes library to and drag it there. Depending on how large your library is and the speed of your drives, it could take anywhere from minutes to hours.



## 5) REDIRECTING ITUNES

Once the copying process is complete, hold the Option key and open iTunes from the Dock or your Applications folder. A pop-up window will appear prompting you to create or choose your library. Select "Choose Library".

Now navigate to the iTunes folder that is in your external hard drive. Open it and scroll until you see the iTunes library file - "iTunes Library.itl." iTunes will now use that folder as the default folder for the library.



## 6) CLEANING UP

You can quit iTunes and delete your original "iTunes" folder in your home directory.

If you open iTunes without connecting the external hard drive with your iTunes library, iTunes will prompt you with an error message indicating that the library cannot be found. This can be fixed simply by connecting the external hard drive and reopening iTunes.

### WHY NOT COPY THE FILES YOURSELF?

Of course, one could also manually copy all the files over to external hard drive and then re-add them to iTunes. However, doing so will also mean losing all your metadata - information such as play counts, last-played dates, ratings, playlists and so on. Additionally, if you have not been diligently organizing your media, copying manually could mean missing out on some files. It's better to let iTunes organize for you first.

# GAMES GAMES GAMES!

## Essential Gaming Companions

by Salehuddin Husin

We figured it was time to get back to basics this month. Sure we may dabble in a game app or two but there hasn't been a game centric App Attack in a while, which makes this one all the more needed. Oh yeah, everything's free to download so don't worry about the cost.



### EVOLVE: HUNTER'S QUEST

iOS, Android



Unlike some companion apps, there's no energy mechanic (where you need to wait to play), you can

play as much as you want and then transfer the experience you gain to the Evolve main game on consoles or PC. At its heart, the game is your typical match 3 puzzle in the vein of Puzzle Quest. Matching icons charge skills which unleash different effects when used. It's fun and quite lengthy and the fact that you can play as much as you want without penalty makes it a pretty good deal.

### DYING LIGHT: COMPANION

iOS, Android



Unlike the Evolve app, Dying Light: Companion requires you to have the main game and have

a registered account (made from within the main game) before you can play. It's free but it's more of a thing you can check in every few hours rather than play. The companion app allows you to send scouts on missions for items which you can then use in the main game, offering little variety other than choosing what mission and who to send. It's better than nothing we suppose, especially if you're hooked on the main Dying Light game.

### THE WITCHER: BATTLE ARENA

iOS, Android



Battle Arena isn't tied to any Witcher game but it's a free MOBA. We figured with Witcher 3 being

delayed, Witcher fans need something Witcher related to tide them over and Battle Arena fits the bill. While the controls and balance could use a bit of tweaking, the game's pretty decent, especially if you're a fan of the genre. You can unlock everything by playing (a whole lot) so there's really no advantage to paying other than getting characters and skins faster. It takes a pretty beefy phone to run it full throttle though.

### ASSASSIN'S CREED UNITY: COMPANION

iOS, Android

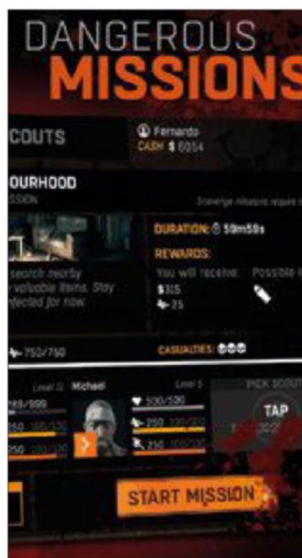


Unity will forever be the game that tarnished the Assassin's Creed name. But if you're

one of the few who play the game, this companion app is a must. Gameplay's similar to the Dying Light app (you need to send assassins out on missions) except here you also have to solve incredibly frustrating puzzles using a sonar-like mechanic. The only reason we're talking about the app is that it's a must if you're somebody who wants to 100% the game, as the app is the only way to unlock otherwise unobtainable costumes and items.



Merge three or more icons to do damage to your enemy.



Send your scouts out on missions and wait for the results.



Familiar characters from the games join all new ones.



You basically need to play the game to get everything there is to get in Unity.



Probably Nikon's last great split-body camera, the 4MP Coolpix 4500 was launched in 2002. It had successors in the Coolpix S4 and S10, but the camera industry had already moved on.



PHOTOGRAPHY VERNON WONG ART DIRECTION KEN KOH



Synology®



Full HD  
1080



DLNA

# DS214play

EMBRACE THE ULTIMATE MEDIA CENTER



DS214play is a 2-bay NAS optimized to fulfill the increasing need for high-quality photo, music, and video streaming, while keeping all other aspects uncompromised.



## 1080p Full HD VIDEO TRANSCODING

DS214play provides non-degraded multimedia experience even when the format is not supported by your player.

## THE MEDIA CENTER IN YOUR LIVING ROOM

Support Chromecast, Apple TV, Samsung TV, and all Bluetooth, AirPlay and DLNA devices

Enjoy the perfect blend of reliability and affordability

Buy 1 or 2-bay Synology NAS + Seagate NAS HDD now, and get FREE Data Recovery Services.



Synology® SEAGATE

More info :



SPECIAL OFFER



EOS  
DIGITAL

Canon

Delighting You Always



1/2000 Sec • f/2.8 • ISO 320 • EF300mm f/2.8L IS II USM

# TAKE CON7ROL

CHAMPIONS KNOW NO FEAR

With the new EOS 7D Mark II, capture each defining moment with the ferocity of intense focus and the subtlety of a masterstroke.

Embrace the new standard of fast, high-precision AF with a responsive 65-point all cross-type AF system and rapid-fire continuous shooting at 10fps. Driven by Dual DIGIC 6 processors, a wide ISO range and unmatched image quality, the EOS 7D Mark II is the game changer. The time is now - Take Con7rol.

ss

JEREMY LEE

Action Images, a Reuters company



20.2 MEGA  
PIXELS  
CMOS

DIGIC  
6  
DUAL

ISO  
16000  
16000

Dual Pixel  
CMOS AF

Cross-type  
65 AF

10.0  
Frames  
Per Sec

Made in  
JAPAN

FOLLOW US ON:



Canon Singapore



@CanonSingapore



Canon Singapore Pte. Ltd.

For product enquiries: 6799 8888 (Mon-Fri: 8:30am - 5:30pm) [www.canon.com.sg](http://www.canon.com.sg)

EOS 7D Mark II